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Army Reserve Components Research Roadmap (Volume 1): ARI Research Summary

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There is increased awareness of the Reserve components (RC) and their role in our national defense. Downsizing and federal budgetary constraints continue to impact this role as well as the structure of the RC. In the past, most policy and practice considerations focused on the Active Component (AC). Research and experience, however, suggest that important differences exist between the tow components. Thus, the results of manpower, personnel, and training research conducted with the AC may not necessarily apply to the RC.

The goal of the present project is to highlight the results of research conducted for the RC by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and to generate an agenda for future ARI work that is responsive to current and projected RC needs. The work is documented in two separate volumes. The present report (Volume 1) provides a brief overview of the RC environment and includes summaries of ARI research products/findings currently available for RC use. Most of ARI's research that has directly involved the study of RC issues is related to training. Other research has focused on manpower and personnel issues, such as recruiting and retention. The second volume discusses RC research in a number of domains (e.g., training-related areas, recruiting, retention, leadership).

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THE U.S. ARMY RESEARCH INSTITUTE'S RESERVE COMPONENT RESEARCH PROGRAM: PRODUCT REVIEW AND FUTURE DIRECTIONS

FINAL INTERIM STUDY REPORT

ARMY RESERVE COMPONENTS RESEARCH ROADMAP (VOLUME 1): ARI RESEARCH SUMMARY

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Army Reserve Components Research Roadmap (Volume 1): ARI Research Summary

Executive Summary

Research Requirement

This decade has brought with it increased Congressional and military awareness of the Reserve Components (RC) and its role in our national defense. Downsizing of the military and federal budgetary constraints continue to impact this role as well as the very structure of the RC. In the past, most policy and practice considerations focused on the Active Component (AC), with the RC regarded as having the same characteristics and operational environment as that of the AC. Indeed, under the Total Force concept, the RC has become more integrated into the training standards and deployment plans of the AC. Research and experience, however, suggest that important differences exist between the two components. Thus, the results of manpower, personnel, and training research conducted with the AC may not necessarily apply to the RC.

The goal of the present project is to highlight the results of research conducted specifically for the RC by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and to generate an agenda for future ARI work that is responsive to current and projected RC needs. The work is documented in two separate, but related, report volumes. The present report (Volume 1) provides a brief overview of the RC environment and includes summaries of ARI research products/findings currently available for RC use. The second volume discusses RC research in a number of domains (e.g., various training-related areas, recruiting, retention, leadership). The discussion considers the research ARI has already conducted, related research carried out outside ARI, and input from key ARI scientists and RC personnel and policy-makers. The intent of Volume 2 is to help structure an ARI research agenda that maximally satisfies the immediate and long-term needs of the RC.

ARI Research Products

Most of ARI's research that has directly involved the study of RC issues is related to training. In this report, we have organized training research into three categories: (1) Training Aids, Devices, Simulators, and Simulations (TADSS)-based training, (2) distance learning, and (3) other. Other research has focused on manpower and personnel issues, such as recruiting and retention.

Training (TADSS-Based Training)

Tank Gunnery (See report pp. 2-2 through 2-7). ARI developed a simple tool for ARNG units to use in predicting live-fire gunnery performance (Morrison & Hagman, 1994). This tool can help ARNG trainers make quick and accurate assessments of the readiness of individual tank crews for live-fire gunnery before their arrival on the range, thereby maximizing the payoff from each crew's live-fire experience while conserving costly main-gun tank ammunition in the process. The prediction tool also provides researchers with an empirically derived set of performance standards for incorporation into future gunnery training strategies that until now have relied on speculation to estimate the level of device-based gunnery proficiency needed to ensure a crew's successful first-run Table VIII qualification.

Device-Based Training Strategy (pp. 2-8 through 2-12). ARI developed a proficiency-based strategy for the ARNG that maximizes the efficiency of Conduct of Fire Trainer (COFT) usage, provides specific guidance to support standardized implementation at the company level, and promotes successful transition from device- to tank-based training and associated live-fire gunnery qualification on Table VIII (Hagman & Morrison, 1996). The strategy shows ARNG armor unit trainers how to complete the device-based portion of their tank gunnery training programs in just 3 drill weekends, and afterwards to be able to predict how many and which crews will be first-run qualifiers.

Rifle Marksmanship (pp. 2-12 through 2-18). To enable ARNG units to train to required levels of individual and collective skill proficiency, ARI explored the use of the engagement skills trainer (EST) at home station locations. The positive relationship found between simulated rifle marksmanship performance on EST and live-fire rifle marksmanship performance on the range permitted development of an EST-based tool for predicting the probability of successful first-attempt M16A2 rifle qualification (Hagman, in press). This research provided ARNG unit trainers with an easy-to-use tool for predicting range-based rifle marksmanship performance on the basis of simulated record fire performance on the EST and identifying soldiers in need of remedial training prior to their arrival on the range. It also supports the notion of using EST for yearly rifle marksmanship qualification firing when access to outdoor range facilities is limited.

Collective Training (pp. 2-18 through 2-24). ARI has developed simulation network (SIMNET) training scenarios that have made structured collective tactical training available to ARNG platoons, companies, and battalions. The scenarios and operation of the SIMNET training program are explicitly designed to support conduct during inactive duty multiple unit training assemblies. As evidence of the high opinion of that training, 22 ARNG battalions conducted exercises between October, 1993 and September, 1996.

Staff Training (pp. 2-24 through-2-28). The major difference between effective and ineffective battle staffs is their level of staff integration--the ability to obtain and share information within the staff, to make staff decisions, and to perform as a team. In support of training directed at staff integration, ARI developed materials for the JMSE (which trains the full

battalion staff) and the Commander/Staff Trainer (C/ST) (which trains staff officers). As a result of ARI's research, ARNG units now have the ability to conduct progressive staff training: low-difficulty training of staff groups using C/ST (now renamed Staff Group Trainer-SGT) followed by a demanding, realistic full-staff exercise using JMSE.

Computer-Based Instruction (CBI) for Battle Staffs and FSB Companies (pp. 2-28 through 2-33). One promising approach to deal with limited training time and lack of access to equipment in the ARNG is computer-based instruction (CBI). Under SIMITAR (the simulation in training for advanced readiness program), ARI used CBI to develop opportunities for officers to learn battalion and brigade staff skills locally and on demand (BDM Federal, 1995, 1996). ARI also developed opportunities for combat service support (CSS) units and individuals to practice their skills locally (Krug & Pickell, 1996). Through this research, many lessons were learned regarding how to train critical staff and FSB company skills. Because of the flexibility of the programs, this training can be conducted at home, in the armory or state academies for individual study via modem or in a network configuration, or at a stand-alone computer.

A Remotely Conducted Command Post Exercise (CPX) (pp. 2-33 through 2-35). Although JMSE and SGT training systems allow for coordination with simulated brigade headquarters and adjacent battalions, there remains a need to develop teamwork and to refine standing operating procedures. ARI conducted research to determine the feasibility, as well as the cost, of conducting remote exercises, wherein geographically dispersed units must intercommunicate from their home stations through the use of special long-distance communications equipment (Smith, Hagman, & Bowne, 1987). The analysis of costs and benefits of the remote CPX has provided Army trainers with information on options for restructuring staff training to increase efficiency and, perhaps, provide additional training. The results also suggest that similar benefits could be achieved by making JMSE and SGT available to ARNG units without their having to travel to a central site.

Individual Tactical Skills (pp. 2-36 through 2-43). ARI developed interactive videodisk training for platoon leaders and platoon sergeants on tactical skills such as estimating enemy actions and planning control measures. The tryout of the resulting RC Armor Junior Leader Tactical Training Program showed that the training addressed an acute need and confirmed the potential of multi-media interactive technology for meeting that need.

CBI for Maintenance Training (pp. 2-39 through 2-43) ARI contributed to development and evaluation of a self-study program to train M1 mechanics using CBI -- the Model Training Program for Reserve Component Units (MTP-RC) (Graham, 1987). A trial implementation showed the applicability of computer-managed CBI for maintenance training.

Training (Distance Learning [DL])

Asynchronous vs. Synchronous Delivery (pp. 2-44 through 2-45). ARI developed an automated decision tool to help training developers decide whether DL should be delivered in a synchronous or asynchronous mode (Hagman & Dykstra, 1988). Synchronous delivery requires simultaneous instructor-student interaction using technologies such as audio and video

conferencing. In contrast, asynchronous delivery does not require the instructor and student to interact concurrently. Technologies that support asynchronous delivery include CBI, interactive videodisk-based training, and computer conferencing.

Asynchronous Computer Conferencing (ACC) (pp. 2-46 through 2-52). ARI established a five-year research program devoted to studying the application of ACC within the ARNG (e.g., Hahn, Ashworth, Phelps, Wells, Richards, & Daveline, 1991). The research focused on a module in the Engineer Officer Advanced Course and the Basic NCO Course common core. The research showed that an ACC course can develop a level of skill that is comparable to resident training with costs that are similar or less than resident instruction, even allowing for differences in throughput. The study resulted in three products to facilitate the extension of ACC to other contexts: (a) a review of literature related to distance learning (Wells, 1990); (b) a job aid for instructors in ACC (Harbour, Daveline, Schurman, Richards, Hahn, & Wells, 1990); and (c) a document for course developers and managers for implementing ACC according to the Systems Approach to Training (Hahn et al., 1990).

Strategy for DL Implementation (pp. 2-53 through 2-55). The National Defense Authorization Act for 1995 directed the National Guard Bureau to establish a distance learning program. That directive is being accomplished through establishment of regional networks that will have a DL site within a 90-minute commute for all ARNG soldiers (eventually to be within 60 minutes). The first step in establishing the regional networks was to develop a demonstration network covering four states and the District of Columbia. ARI is supporting the ARNG by developing procedures to establish the demonstration network and by developing content to be delivered through DL technologies. As the courses are administered, ARI scientists are identifying lessons learned that will enable a smooth transition to wider implementation of DL.

Training (Other)

Aviation (pp. 2-56 through 2-60). ARI developed and administered surveys in two projects intended to assess the adequacy of training resources for ARNG aviators (McAnulty & DeRoush, 1988; Szabo, Ruffner, Cross, & Sanders, 1986). The surveys on time requirements identified actions that ARNG planners can take to enable aviators to use time more efficiently and remedial actions to encourage aviators in the bubble of retirement eligibility to stay in the ARNG. The surveys on ammunition and gunnery gave the proponent for Army aviation a basis for defending ammunition allocations. Probably more important for the long-term, both projects demonstrated the value of feedback from the field and the importance of a current training resources database.

Lanes Training (pp. 2-60 through 2-62). The BOLD SHIFT initiative was a response to a concern by the Army Chief of Staff that RC units tend to focus at too high a level of training without establishing a strong foundation of individual and lower-echelon skills (Jones, 1992). ARI monitored training at three sites to identify lessons learned by those who provided support as well as those who received training and to identify costs associated with the training (Ashworth, Phelps, Graham, & Wisher 1992). The case studies developed by ARI have enabled

the Army to document the success of the squad and platoon STX lanes concept implemented during annual training.

Individual Ready Reserve (IRR) Training (pp. 2-62 through 2-68). ARI has conducted two research studies to assess IRR training. One study involved a two-year retraining program for IRR rotary-wing aviators, including flight and academic training, that resulted in improved effectiveness and efficiency (Wick, Millard, & Cross, 1986). The second study was part of an ARI program of study that examined predictors of performance during IRR field medics training (Wisher, Sabol, Maisano, Knott, Curnow, & Ellis, 1996). Both studies demonstrated the cost-effectiveness of rapid train-up for the IRR. The work with IRR aviators showed that the knowledge component of IRR training can be conducted effectively, at least for officers, in a self-study mode. In relation to mobilization priorities, both studies demonstrated that the depth of AC experience is at least as important as the length of separation, and that factors such as civilian job similarity may improve the effectiveness of selecting IRR members to be activated.

Manpower and Personnel

Multinational Force and Observers Research Program (pp. 3-2 through 3-9). The U.S. has been involved in the Multinational Force and Observers (MFO) peacekeeping mission in the Sinai since 1982. In response to a directive from the Chief of Staff, the Army examined the feasibility of recruiting qualified RC volunteers and deploying a battalion sized unit composed of AC and RC soldiers for a six month assignment in the Sinai. ARI conducted a longitudinal case study of this mission that assessed personnel, training, attitudes and perceptions, family support, and home unit impact (Phelps & Farr, 1996). Overall, the results indicated that sufficient numbers of qualified RC volunteers were eventually recruited for the MFO; the family support system implemented during the MFO was successful; unit morale increased during the MFO; units were able to compensate for small temporary losses in personnel; and the family support system implemented during the MFO was successful.

STAMP: Measuring the Attitudes and Concerns of RC Soldiers in Operation Desert Storm (ODS) (pp. 3-9 through 3-14). The Surveys of Total Army Military Personnel (STAMP) gauged the attitudes and concerns of soldiers during and after Operation Desert Storm (ODS) (Harris, Elig, & Oliver, 1992). ARI developed STAMP to measure the impact of ODS and downsizing on the retention, morale, and readiness of the Army's AC and RC soldiers. In terms of the RC, survey results revealed that many soldiers experienced a loss in income as a result of being deployed for ODS and several communication problems both within the Army and between the Army and the member's family were identified.

An Examination of IRR Call-Up Attitudes During ODS (pp. 3-14 through 3-18). The ODS mobilization provided ARI with the opportunity to explore the problems experienced by members of the IRR during mobilization. ARI developed a 31-item questionnaire to assess Army background, job task preparation, and the impact of the call-up process (Steinberg, 1991). The results indicated that a majority of IRR soldiers exhibited a negative reaction upon being called up. This negative reaction was attributed to numerous factors, including lack of

organization during in-processing, poor treatment by those in charge, inadequate training, and poor medical treatment.

New Recruit Surveys (pp. 3-18 through 3-22). ARI developed the New Recruit Survey (NRS) to help USAREC tailor advertising campaigns and recruiting policies. The survey has been administered at points throughout each year since the early 1980's to AC and RC recruits. USAREC took over responsibility for the NRS in 1987. Although analyses of RC data collected prior to 1987 were limited, ARI did link RC NRS data collected in 1982 to subsequent attrition to examine factors associated with turnover from the RC. This research showed that higher quality soldiers tended to have lower attrition rates than did lower quality soldiers and that, for most recruits, family status was not a good predictor of attrition (Dale, 1987). Also, higher than average rates of attrition occurred for reservists who indicated their primary reason for enlisting was unemployment.

Army Experience Survey (pp. 3-22 through 3-26). In an attempt to answer questions about the Army's ability to provide job satisfaction and retain high-quality soldiers serving in RC units, ARI used data from the Army Experience Survey (AES) to develop a model of RC job satisfaction (Lakhani, 1990). Results showed a positive relationship between job satisfaction and the Army's developmental impact and a negative relationship between dissatisfaction with the environment and job satisfaction. Soldiers who had joined the AC for schooling/training reasons had higher levels of job satisfaction with their RC units than those who joined for other reasons. Results also indicated that job satisfaction increased with increases in the institutional or patriotic orientation of soldiers, and that the effect of Army service on satisfaction of relationship with spouse during service increased job satisfaction in RC units.

An Examination of Attrition after NTC, Reforger, and Blazing Trails Exercises (pp. 3-26 through 3-31). To increase training readiness for the RC, the Army has provided more training opportunities through programs such as the NTC, Reforger, and Blazing Trails. ARI conducted a study that showed that units participating in these additional training opportunities had higher attrition rates than comparison units (Grissmer, Kirby, & Nogami, 1990). Factors associated with this increased attrition were the additional training time which caused (a) family conflicts which led to separation or transfer, (b) employer problems which led to separation or transfer, and/or (c) increased loss of income. There was also evidence that tighter physical conditioning and performance standards in preparation for training resulted in the transfer or separation of marginal performers.

Robust Test: Assessment of the Impact of Differing Levels of Resources on Selected ARNG Units (pp. 3-32 through 3-35). The Robust Test was designed to examine the readiness impact over time of differing levels of full-time training support personnel and increments of additional training assemblies on the training resources needed by the ARNG. ARI provided support to Robust Test by assessing the impact of the differing levels of resources on leadership, motivation, and unit cohesion (Siebold & Browning, 1996). Results indicated that companies with additional full-time support personnel and additional training assemblies were among the highest scoring companies in terms of their perceptions of unit leadership, motivation, and

cohesion. Control condition companies were among the lowest scoring companies in their battalions.

The Army Family Research Program (pp. 3-36 through 3-39). The Army Family Research Program (AFRP) was a major effort by ARI to collect information about uses of pay, attitudes of family and friends toward the service, Army family programs, perceived community problems, use of civilian community social services, and family readiness for member mobilization. As part of the AFRP, six surveys were developed and administered to USAR and ARNG soldiers and their spouses (Westat, Inc., 1990). In general, findings indicated a lack of knowledge and use of Army family programs, especially among the junior enlisted spouses, and that absence from the family was viewed as a problem by both RC members and spouses. Furthermore, satisfaction with spouse and family was found to be very important to an RC soldier's performance and retention.

Factors Affecting Reenlistment in the Army Reserves: Evidence From the 1986 DoD Survey (pp. 3-39 through 3-41). ARI matched survey responses to the 1986 DoD Reserve Components Survey to actual retention outcomes from January 1986 to September 1987 in an attempt to expand the research base on reserve reenlistment behavior. This research examined the moonlighting theory, which suggests that the decision to remain in the reserves is affected by the wage offered by the reserves, the wage in other moonlighting opportunities, and factors affecting the member's marginal value of time at the constrained hours of work in the primary job.

Utilization of Findings

ARI research products and findings are described in sufficient detail in this report to help RC personnel determine the utility of this existing research to meet current needs. This Volume 1 report also provides part of the foundation for the agenda for future ARI research that is the subject of the companion Volume 2 report. Together, the two volumes are intended to help assure that ARI successfully serves the needs of its USAR and ARNG clients.

Army Reserve Components Research Roadmap (Volume 1): ARI Research Summary

Table of Contents

CHAPTER 1: Introduction

The purpose of this project is twofold: (a) to provide in a single source document the results of selected research and development (R&D) efforts undertaken by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) on behalf of the U.S. Army's Reserve Components (RC) (i.e., Army National Guard [ARNG] and Army Reserve [USAR]), and (b) to generate an agenda for future ARI work that is responsive to current and projected RC needs. Project results are documented in a two-volume report. This first volume describes the R&D results obtained in the areas of manpower, personnel and training from the year 1980 to the present. Volume 2 describes the proposed short- and long-term research agenda.

Organization of Report

This volume first describes the RC environment, including the organization and strength of the RC and how its environment differs from that of the Active Component (AC). This is followed by a review of training- (Chapter 2) and manpower- and personnel-related findings/products (Chapter 3). A description of information databases currently available for RC use is provided in Appendix A. The product summaries in each chapter cover why, how, and with whom the research was conducted, what was found/developed, what the implications are, and where more information can be found. The latter is provided in the form of specific product and related references placed at the end of each product summary. The second volume (published separately) discusses R&D work projected to be needed by the RC over the short and long term.

The RC Environment

Organization and Strength

The RC consists of the ARNG and USAR. Its purpose is to augment the AC in times of war and national emergency by providing trained soldiers and units (U.S. Army Training Board, 1987). As of 1995, there were approximately 630,000 soldiers in the RC, slightly over half of total Army strength (Phelps, 1996). This number should decrease as projections for FY98 reduce the end strength of the RC to 575,000 funded positions (i.e., 367,000 ARNG; 208,000 USAR) (Research and Staff Support Office, 1996). Division of strength within the RC is approximately 48% ARNG units, 52% USAR (i.e., 28% in troop program units and 24% in the Individual Ready Reserve [IRR]). ARNG units are predominantly combat arms, whereas USAR units are predominantly combat support (CS) and combat service support (CSS).

AC/RC Differences

Many aspects of the RC environment are different from those of the AC environment (see Table 1-1). The purpose of this section is to highlight some of these differences and, in doing so, provide the backdrop against which RC-related R&D in the areas of manpower, personnel, and training must be conducted.

Table 1-1. AC/RC Differences.

Variable	Active Component	Reserve Components
Training Time	Year-round	38/39 days
MOS Mismatch	Minor problem	Major problem
Recruitment	Nearly all non-prior service	Half prior-service; half non-prior service
Retention Incentives	Career benefits, salary, retirement pension	Extra dimension in life; retirement pension
Residence	Many on post, most others nearby	None on post, many coming from long distances
Family/Military Conflict	Moderate for all though less for senior members	Moderate for junior, but severe for senior members
Military Spouses	Much networking	Little networking
Employer/Military Conflict	Not applicable	Moderate for junior, but severe for senior members
Career Development	Structured and desired; little conflict with personal life	Unstructured and ambiguous; severe conflict with personal life

Training Time. Perhaps the most obvious difference between the AC and RC is the amount of training time allocated to each. RC units are officially allocated 38 (USAR) and 39 (ARNG) days per year for training purposes. Although additional time is allocated to individual soldiers and designated units for special purposes (e.g., New Equipment Training [NET], National Training Center [NTC] rotations), at best (using 240 days as the basis of comparison) RC units have less then one-fifth of the time available to their AC counterparts; at worst (using 365 days as the basis of comparison) RC units have slightly less than one of every nine days available to AC units.

The RC training year is divided into two parts: Inactive Duty Training (IDT) and Annual Training (AT). IDT time is allocated on the basis of discrete periods called Unit Training Assemblies (UTAs). The typical RC unit is allocated 48 UTAs per year (exceptions include aviation, nuclear, and airborne units that receive more). Whenever two or more UTAs are combined into a continuous training period, the result is called a Multiple Unit Training Assembly (MUTA). A MUTA-4, therefore, is a continuous block of four UTAs, and so forth.

Each UTA must be at least 4 hr long, though they may be longer. Thus, at a minimum, 48 UTAs equal 24, 8-hr days.

The official 38/39-day allocation is derived from the combination of these 24 days (one, 2-day weekend per month for IDT plus 14/15 days of AT. AT consists of 14 continuous days for USAR units and 15 continuous days for ARNG units. AT is almost always conducted during the summer at an RC or AC Major Training Area (MTA). During these periods, units are able to assemble at higher levels than during IDT and, depending on their organization, train in a battalion or higher configuration. Few units, however, have their full assigned strength available at AT because some number of their soldiers will be training elsewhere (e.g., basic/advanced training, career development training) during this same period. While 14/15 days are officially allocated for training, units do not have all of this time available for training. On the average, for example, RC units spend 3/4 days of this "training" time for such things as travel, pick up and turn in of equipment, and administrative set up.

Unit Dispersion. RC units are also more geographically dispersed than AC units. Based on data gathered by the U.S. Army Training Board (1987), RC units (i.e., battalion, company, detachment) must travel 105 miles (3 hr) to their higher headquarters. Comparable AC units are usually within walking distance of each other. At battalion level, the average unit is dispersed over a 150-mile radius and some extend to over 300 miles. Their AC counterparts are typically clustered within a mile or less of each other. At higher levels of command (e.g., division), few RC headquarters have all of their subordinate units co-located even in the same state; many extend over several, and some cover as many as 12, states. Comparable AC units live on a single installation or on several within a few hours drive. The dispersion of RC units is dictated largely by recruiting capacities related to population densities and the ability of soldiers to get to their units for training from reasonable distances. Even so, many soldiers travel several hundred miles one way to train during IDT. This level of dispersion within units forces RC commanders to devote more time than their AC counterparts moving around among their units and higher headquarters.

Distance between RC units is only one aspect of dispersion. The distance from a given unit to common training support locations is also lengthened. On average, RC units travel about 9 miles to get to a motor pool (primarily for wheeled vehicles), and 129 miles to train on their major equipment which is typically located at Mobilization and Training Equipment Sites (MATES). In order to reach a collective training site, they must travel 40 miles to the nearest Local Training Area (LTA) and 154 miles to the nearest MTA. To get to a rifle range, RC units must travel an average of 68 miles (only 20% of RC units have local small-caliber ranges), and if an RC unit wishes to draw devices for training, it must travel 150 miles to do so. These are all average one-way distances and whenever they come into play, time is needed to make the trips.

Overall, geographical dispersion impacts RC units in the following ways: (a) communication and coordination among and between units is more difficult; (b) the frequency with which units can use training facilities and areas is reduced; (c) the level of difficulty in providing support, evaluation, and other services to subordinate units is increased; (d) the ability

of next higher headquarters to influence training in person is decreased; (e) reaction time to change is increased; and (f) most training must be conducted at the local home-station armory or reserve center.

Turbulence. It is commonly believed that while RC units, compared to their AC counterparts, must train under severe constraints, stability is a major offsetting characteristic. While this perception is true in absolute terms, it is false in relative terms. In fact, RC units experience more rather than less turbulence than AC units.

Turbulence comes in several forms; the most common one applies to personnel. The reported forcewide external annual turnover experienced by the ARNG and USAR for enlisted personnel is 19% and 31%, respectively. At the unit (i.e., company) level, however, these figures are 32% and 43% (13% leave their unit but stay in the force). At the E5 and below level, turbulence in units rises to 38% and 48% per year.

Unlike in the AC, many soldiers joining an RC unit are not Military Occupational Specialty (MOS) qualified. Between 38% (USAR) and 53% (ARNG) of them (non-prior service) have no military training upon assignment and a portion of the remainder (prior service) do not have MOS training in the duty positions to which they are assigned. The result is that about 70% (USAR) and 75% (ARNG) of all new enlisted soldiers arriving in a unit each year require training to become qualified in the MOS to which they are assigned.

In addition to personnel turbulence, RC units are also faced with a significant level of structural turbulence. RC units have historically faced a higher level of structural turbulence than AC units because of functional conversion (e.g. from a tank battalion to a signal battalion). This type of structural turbulence is likely to increase as a result of downsizing and anticipated organizational changes in the RC over the coming years.

Family and Civilian Job Conflicts. The AC and RC also differ in respect to the magnitude of family conflict experienced. As reported in a series of ARI studies conducted by Moskos (1990a, 1990b, 1990c), military/family conflict in the RC tends to be more severe at senior levels than at junior levels, whereas this situation tends to be reversed in the AC. This is most likely the case because time demands beyond the typical 38/39 days are more pronounced for career reservists, heightening the conflict as a soldier moves up the RC career ladder. Compounding this situation is the need for RC soldiers to work out these conflicts within the family itself without the opportunity to share experiences with other RC members and their families.

Perhaps more significant than military/family conflict, is the conflict experienced by RC soldiers with their civilian employers, with this conflict felt more severely by those with the most demanding civilian jobs. For noncommissioned officers (NCOs), the demands of career development are noted most in the need to take military courses for changes in their MOS and for promotion eligibility. For officers, the demands of career development are most often in the form of resident training that requires extended absences from the civilian job (and unit as well).

Regardless of NCO or officer rank, the biggest problem for RC soldiers holding a civilian job is finding the time required to "climb the RC ladder." What many reservists find is that their civilian work situation suffers if they take the time to go off to school or devote extra time to their military unit.

Conclusions. Clearly, the RC environment differs in many ways from that of the AC. Because of these differences the often-made assumption that findings and products provided by the R&D community for the AC will also apply to the RC must be called into question. In fact, it is probably safer to assume the reverse (i.e., that findings/products developed for the RC will also apply to the AC). In any event, ARI has been aware for quite some time now of the real challenges faced by the RC as a result of its unique environment and of the RC's need for RC-specific R&D to help meet these challenges. The remainder of this report describes what kind of R&D efforts have been conducted by ARI since 1980 in the areas of manpower, personnel and training and what findings/products are currently available for RC use.

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CHAPTER 2: Training-Related Product Summaries

As part of the effort to assist the RC in meeting the challenges imposed by the unique environment in which it must operate, ARI established a research unit in Boise, ID in 1985 devoted specifically to the conduct of RC-specific R&D activities. One of this research unit's first projects was to conduct a nationwide mail-out survey of 7,446 ARNG and USAR junior enlisted soldiers, NCOs, and officers to identify what they perceived to be specific problems in the area of training and what solutions they would propose (Eisley & Viner, 1989). (See Table 2-1 for the number and percentages of surveys returned by soldiers in each category.)

Table 2-1. Numbers and Percentages of Surveys Returned for Nationwide Survey.

Rank	***ARNG***		***USAR***		***Total***	
	Number	%	Number	%	*Number*	%
Jr. Enlisted	960	68	465	54	1425	63
NCO	960	76	430	61	1390	71
Officer	730	80	559	72	1289	76
Combined	2650	74	1454	62	4104	69

Consistent with the observations mentioned in Chapter 1, respondents to this survey identified training problems associated with geographical dispersion, restricted access to live-fire range/maneuver areas, and family and job conflicts. Their overriding concern, however, was insufficient training time and its nonproductive use when available. Respondents estimated, for example, that only 35% of their IDT time was spent training, with the rest of the time spent on such things such as administrative duties and travel to and from LTAs and MTAs.

Two ways suggested to improve training effectiveness/efficiency were to increase the availability of training aids, devices, simulators, and simulations (TADSS) for use at home-station armories, and to institute the concept of home study. Eighty-one percent of the respondents agreed that TADSS would help improve home-station training effectiveness/efficiency, and 69% agreed that the potential benefits of home study should be explored. Table 2-2 shows the percentages of soldiers that responded favorably to the home-study concept and their thoughts on what type they would accept doing.

Table 2-2. Percentage of Soldiers Agreeing with Questions About Home Study.	
Survey Question	***Overall***
I would work more paid hours if I could study at home with follow-up testing	68
I would do home study in addition to regular drill	77
I would do home study in place of regular drill	48
Home study with video cassettes would be effective	87
Home study with computers would be effective	65

Product Reference

Eisley, M. E. & Viner, M. P. (1989). *Nationwide Survey of Soldier Perceptions of Reserve Component Training* (ARI Research Report). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

As a result of this survey, ARI embarked on an effort to assist the RC in its attempt to enhance the effectiveness/efficiency of training and to increase its accessibility to soldiers at their home-station armories through the use of TADSS, remote delivery technologies, and other training methods and procedures. The rest of this chapter is divided into sections devoted to these three areas.

SECTION 1: TADSS-Based Training

Tank Gunnery

To maximize the payoff from their 39 days available for training each year, ARNG units are looking more and more to use devices for the training of tank gunnery. To ensure successful device usage, a strategy is needed to guide the design and execution of device-based tank gunnery training at the company level where such training typically occurs. Questions that need to be answered include, for example, which device(s) to use, which training and evaluation exercises to conduct, and which proficiency standard(s) to apply, so as to produce device- as well as live-fire proficient crews.

To date, several such strategies have been developed (e.g., Headquarters, U.S. Army Training and Doctrine Command, 1992; Morrison & Hagman, 1994; U.S. Army Armor School, 1993). Although these strategies differ in many respects, each recommends use of the Conduct-of-Fire Trainer (COFT), a stand-alone, high-fidelity device designed for training tank commander and gunner pairs on proper target engagement procedures under fully operational

and degraded mode equipment conditions (Campshure, 1991). In recommending the use of COFT, it is assumed that simulated gunnery performance on it is representative, and therefore predictive, of live-fire gunnery performance on the range. Until recently, this predictive relation had received only limited empirical support (Black & Abel, 1987; Butler, Sterling, & Bergland, 1987; Kuma & McConville, 1982). Recent research at ARI, however, has successfully identified this relation and, from it, developed a simple tool for ARNG units to use in predicting live-fire gunnery performance.

What Was Done

To assess this relation, 58 tank crews (i.e., commander, gunner, loader, driver) from two battalions of a western state ARNG armor brigade underwent an hour of COFT testing a day before firing Table VIII (a live-fire exercise fired annually for crew gunnery certification) (General Electric Company, 1989). The COFT test consisted of four exercises (Numbers 131-134) selected from the device's advanced training and evaluation matrix. The scores for these four test exercises, minus points subtracted for procedural errors (i.e., "crew cuts"), were then added and divided by 4 to provide a mean COFT test score for use in predicting Table VIII criterion performance.

Table VIII consisted of 10 live-fire engagements (6 day and 4 night) for which tank crews received a total score of from 0-1,000 points depending on their demonstrated gunnery proficiency. Each crew's goal on Table VIII was to fire at least the minimum qualification score of 700 on the first run down range. Although most crews failing to qualify on their first run were allowed to refire, only their first-run scores were used as the to-be-predicted measure of gunnery proficiency.

What Was Found

The results of split-group cross-validation procedures identified, as well as confirmed, the presence of a positive linear relation between COFT and Table VIII performance. To enable unit trainers to use this relation to predict which crews will fire a Table VIII qualification score $\geq$ 700 on their first run down range, an overall regression equation was computed for the scores of all 58 crews. The correlation ($r = .77$) between COFT and Table VIII scores was significant, with the former accounting for over half of the variance in the latter ($r^2 = .59$, adjusted $r^2 = .58$). Figure 2-1 shows the resulting scatterplot along with the significant, $F(1, 56) = 79.59$, best fit regression line [$Y' = -26.74 + .95(X_1)$, $SE = 106.22$].

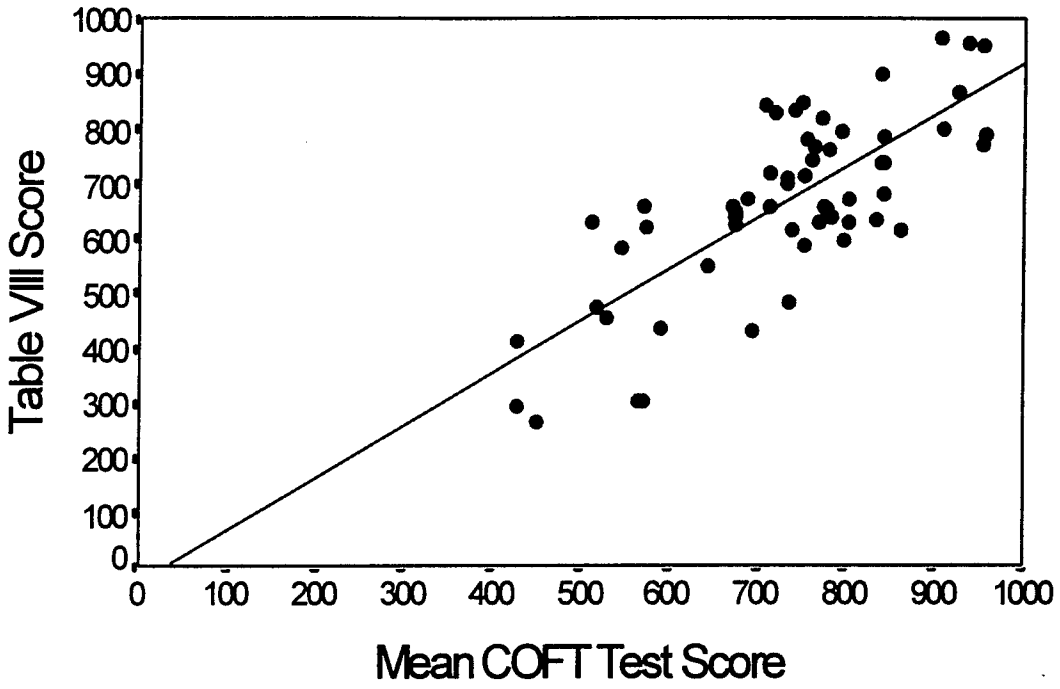

Figure 2-1. Relation Between COFT and Table VIII Scores.

From "Device-Based Prediction of Tank Gunnery Performance," by J. D. Hagman and M. D. Smith, *Military Psychology, 8,* 59-68. Copyright 1996 by Lawrence Erlbaum Associates, Publishers, Reprinted with permission.

Based on this regression equation, it was predicted that tank crews with a COFT test score (X_1) of 765, for example, would on the average fire a Table VIII score (Y′) of 700. Assuming that the actual probability of firing this predicted Table VIII score would follow a normal distribution with $\underline{M} = 700$ and $\underline{SE}_{ind\ y} = 107.50$, the probability of an individual tank crew firing a Table VIII score ≥ 700 for a selected range of potential COFT test scores was estimated. Table 2-3 shows this range of COFT test scores (Column 1) along with each score's predicted mean Table VIII value (Column 2) and associated crew probability of scoring 700 or higher on Table VIII (Column 3). Using this table, a unit trainer can predict that an individual tank crew with a COFT test score of 824, for instance, will on the average fire a Table VIII score of 756 and have a 70% chance of successful first-run qualification.

Conclusions

ARI findings have shown that (a) a positive linear relation exists between simulated gunnery performance on the COFT and live-fire Table VIII gunnery performance on the range, and (b) this relation is of sufficient consistency and magnitude to support development of an easy-to-use COFT-based tool for predicting the probability of first-run tank crew qualification on Table VIII.

Table 2-3. COFT-Based Tool for Predicting a Tank Crew's Chances of First-Run Table VIII Qualification.		
Mean COFT Test Score	***Predicted Mean Table VIII Score***	***Probability of Firing ≥700 on Table VIII***
620	562	10%
669	609	20%
706	644	30%
737	673	40%
765	700	50%
793	727	60%
824	756	70%
861	791	80%
910	838	90%

From "Device-Based Prediction of Tank Gunnery Performance," by J. D. Hagman and M. D. Smith, *Military Psychology, 8,* 59-68. Copyright 1996 by Lawrence Erlbaum Associates, Publishers, Reprinted with permission.

This prediction tool can help ARNG trainers make quick and accurate assessments of the readiness of individual tank crews for live-fire gunnery before their arrival on the range, thereby maximizing the payoff from each crew's live-fire experience while conserving costly main-gun tank ammunition in the process. Just how many Table VIII main-gun rounds could be saved each year through use of the prediction tool can be determined by plotting the estimated number of main-gun rounds fired yearly by the ARNG (maximum of 2561 armor crews) on Table VIII against the predicted probability of first-run qualification. As shown in Figure 2-2, this relation reveals that approximately 1,640 fewer main-gun rounds would be fired on Table VIII for each predicted 10% increase in first-run crew qualification. Table 2-4 shows the specific data used to derive this relation.

The prediction tool also provides researchers with an empirically derived set of performance standards for incorporation into future gunnery training strategies that until now have relied on speculation to estimate the level of device-based gunnery proficiency needed to ensure a crew's successful first-run Table VIII qualification.

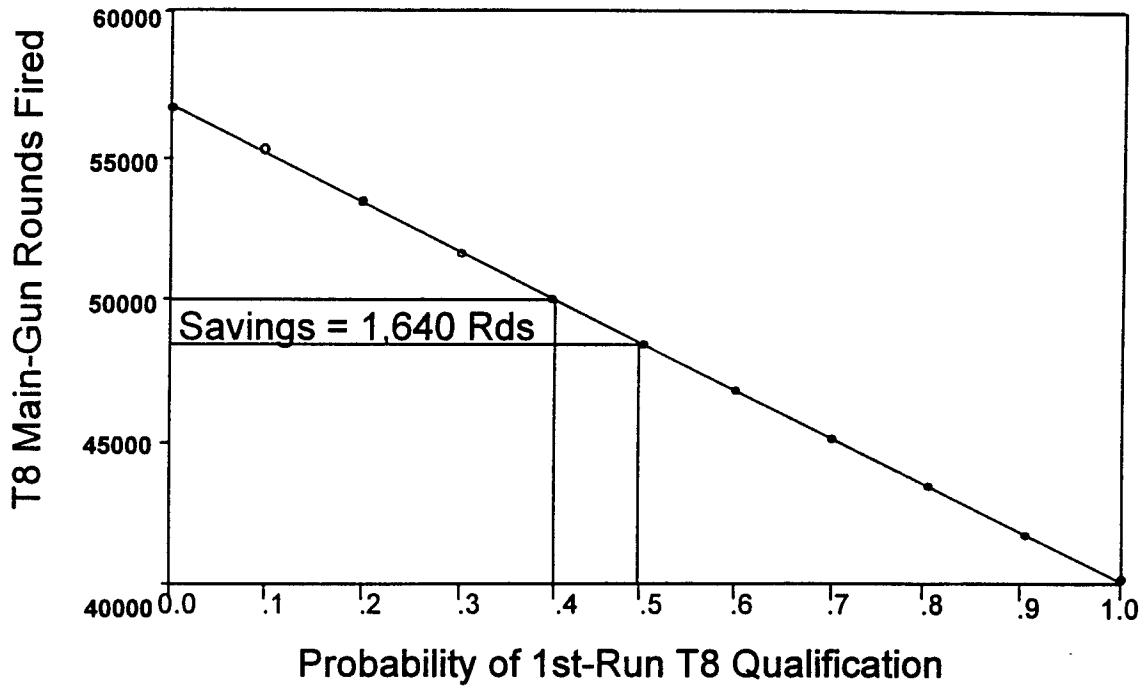

Figure 2-2. Number of Main-Gun Rounds Saved.

Table 2-4. Data Used to Derive Ammunition Savings Analysis.

Prob of 1st-Run Qualification	*# of Crews*		*# Rds Fired*		*Total Rds Fired*
	Q1	*Q2+*	*Q1*[a]	*Q2+*	
.00	0	2561	0	56598	56598
.10	256	2305	4019	50940	54959
.20	512	2049	8038	45283	53321
.30	768	1793	12057	39625	51682
.40	1024	1537	16077	33968	50063
.50	1280	1281	20096	28310	48406
.60	1536	1025	24115	22653	46768
.70	1792	769	28134	16995	45129
.80	2048	513	32154	11337	43491
.90	2304	257	36173	5679	41852
1.00	2561	0	0208	0	40208

[a]Estimated number of rounds fired was based on the results of an analysis of 1994/1995 Table VIII scores for 112 ARNG tank crews (34 first-run qualified [Q1] and 78 second- or later-run qualified [Q2+]) where it was found that Q1 and Q2+ crews fired an average of 15.7 and 22.1 main-gun rounds, respectively.

Product Reference

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Device-Based Training Strategy

Development and validation of the COFT-based prediction tool has enabled ARI to go a step further and develop a proficiency-based strategy for the ARNG that maximizes the efficiency of device usage, provides specific guidance to support standardized implementation at the company level, and promotes successful transition from device- to tank-based training and associated live-fire gunnery qualification on Table VIII.

In general, the strategy shows ARNG armor unit trainers how to complete the device-based portion of their tank gunnery training programs in just 3 IDT weekends, and afterwards be able to predict how many, and which, crews will be first-run qualifiers. In addition, the strategy eliminates any guesswork in determining the crews to be trained, the devices to use, and the training and evaluation exercises to conduct for maximizing the payoff from the training time invested.

What Was Done

Pretesting. The strategy, as shown in Figure 2-3, begins with an hour pretest on the COFT to determine the gunnery proficiency level of each crew. Pretesting calls for the firing of the four COFT advanced matrix exercises (Numbers 131-134) used to develop the COFT prediction tool. Once these exercises are fired, the scores from each are added, after subtracting crew cuts and dividing by 4 to arrive at a total pretest score. This score is then plugged into Column 1 of Table 2-3 to find a crew's predicted average Table VIII score (Column 2) and associated probability of first-run qualification (Column 3). A crew firing 765 on the pretest, for example, is predicted to fire an average score of 700 on Table VIII (if fired multiple times) and to have a 50-50 chance of actual first-run qualification.

Depending on the standard set by the commander for his unit's first-run Table VIII qualification rate (see Table 2-3, Column 3), some crews will pass the pretest (device-qualified crews) while others will not (device-unqualified crews). According to the strategy, only the latter must undergo device-based training. Thus, valuable time is not taken up training crews that are already device proficient.

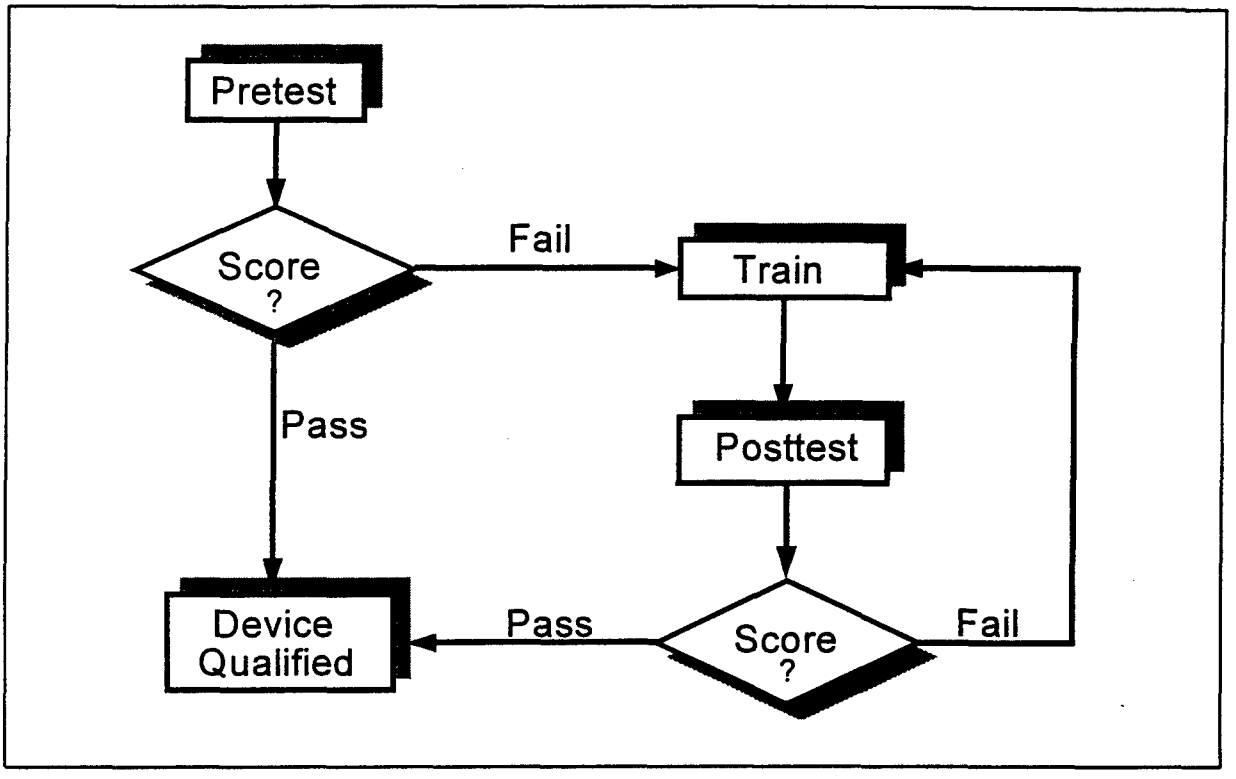

Figure 2-3. Flowchart of Strategy.

From "Research Pays Off for the Guard: A Device-Based Strategy for Training Tank Gunnery" by J. D. Hagman and J. E. Morrison, *Armor, 6,* 48-50. Copyright 1996 by the U.S. Army Armor Center and School, Publishers, Reprinted with permission.

Training. After identifying which crews need to be trained, the next step is to determine which training device(s) to use and which training exercises to conduct. According to the strategy, training can be conducted on either COFT or the Abrams Full-Crew Interactive Simulation Trainer (AFIST), a tank-appended full-crew tank gunnery training device (Snyder, 1996), and should focus on only the simulated Table VIII engagements not performed to pretest standard. This standard is determined by dividing the pretest score (e.g., 765) by 10 (the number of engagements fired per exercise). Any engagements not fired to this standard (e.g., 76.5) must be trained. Table 2-5 shows the training exercises on each device that correspond to each Table VIII engagement.

Table 2-5. COFT and AFIST Training Exercises for Table VIII Engagements.		
Table VIII Exercises	**COFT Training Exercises**	**AFIST Training Engagements**
A1	113, 117	6AT1
A2	101, 111	--
A3	102, 106	6AT2
A4	102, 106, 110	6AT3
A5S	102, 106, 110	6AT4
A5A	102, 106, 110	6AT5
B1S	103, 107, 119	6BT1
B2	105	6BT2
B3	110	6BT3
B4	102, 106, 110	6BT4
B5	113, 117	6AT1
B5A	105	6BT5

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Except for Engagement A2, the simultaneous engagement, which requires use of the Caliber .50 machine gun not simulated by AFIST, using AFIST whenever possible is suggested because of its capability to support full-crew training. Furthermore, if AFIST is not available, training should alternate between or among the training exercises shown in Table 2-5 for the COFT to add the kind of variety needed to promote device-to-tank transfer.

Regardless of which device is used, an easy-to-difficult progression should be followed when pretesting reveals that some crews need training on more than one simulated Table VIII engagement. Table 2-6 shows the difficulty rankings found for live-fire Table VIII engagements (Hagman, 1994). For example, engagement B5 would be trained before B2, A1 before A3, and so forth.

Table 2-6. Difficulty Rankings for Table VIII Engagements.

	Engagement											
	A3 Most	B3	A2	A1	B2	A4	B4	B5	A5S	A5A	B5A	B1S Least
Difficulty Ranking	1	2	3	4	5	6.5	6.5	8	9	10	11	12

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To ensure that tank crews become device proficient and, at the same time, do not pass a training exercise by luck, it is recommended that the proficiency standard for training exercises be set at two successful, but not necessarily consecutive, criterion performances. On COFT, criterion performance is reached upon crew receipt of an "advance" recommendation from the device in the areas of target acquisition, reticle aim, and system management. On AFIST, criterion performance is reached upon crew receipt of a "pass" recommendation from the device for the exercise(s) being trained.

Posttesting. Just because a crew passes the training exercises, it is not necessarily device qualified. So the last step in the strategy is to posttest crews by having them retake the pretest. Those that pass the posttest are considered device qualified; those that fail the posttest must return for further training on devices as outlined above.

Implementation Considerations. The above strategy is designed for unit implementation over three (preferably consecutive) IDT drill weekends once pretesting is completed. It is anticipated that the hour or so needed for pretesting would be included as part of the Tank Crew Gunnery Skills Test (TCGST), with Readiness Management Assemblies (RMAs) used if drill time runs out.

Before the first scheduled drill after pretesting, pretest scores should be compared against the performance standard for first-run Table VIII qualification set by the unit commander (see Table 2-3, Column 3). This allows for a determination of which crews are device-unqualified and which engagements they need to fire during training. Similarly, the training results of this and the next two drills should be reviewed to select the right training exercises for those crews not ready for posttesting and to posttest those that have completed training. Once all crews are device qualified, by virtue of passing either the pre- or posttest, on-tank training begins, probably with Table V (e.g., Department of the Army, 1993) or with Combat Table I (U.S. Army Armor Center, 1995). Regardless of where on-tank training begins, time on the tank is necessary because it allows crews to experience the different aspects of gunnery not practiced or simulated on devices (e.g., open-hatch target acquisition, tank movement, and weapon recoil effects) but important for successful Table VIII qualification.

Conclusions

The above strategy is intended to allow ARNG armor unit trainers to do several things now that they could not do before. For starters, they will be able to schedule device-based training time more efficiently by targeting only crews in need of remediation. They will also know which devices to use and which exercises to conduct when training is called for. And lastly, because device performance standards are keyed to expected live-fire outcomes, trainers will know when their crews have received enough device training to warrant transition to the tank, and what the expected result will be in terms of unit first-run Table VIII qualification rate. After all, tank gunnery training on devices takes time. The strategy just described provides the tools needed to use scarce training time wisely.

Product Reference

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Rifle Marksmanship

Constraints on training time and access to live-fire range/maneuver areas confine most ARNG IDT on weekends to the local armory (i.e., home station) to provide the kind and amount of realistic combat arms-related training necessary to ensure required levels of individual and collective skill proficiency. Even fundamental weapons training suffers because soldiers have limited opportunities to develop and sustain marksmanship skills, engage realistic targets, and practice the kind of tactics needed to succeed on the modern battlefield.

To enable ARNG units to train to these ends while at home station, several devices have been fielded to support the training and evaluation of rifle marksmanship. They include the Weaponeer (Schendel, Heller, Finley, & Hawley, 1985), Multipurpose Arcade Combat Simulator (MACS) (Schroeder, 1985), and the Engagement Skills Trainer (EST) (Firearms Training Systems, Inc., 1996). Both Weaponeer and MACS are individual soldier trainers, whereas the EST is a squad-level device capable of supporting the training and evaluation of up to 12 soldiers at a time on rifle marksmanship as well as defensive tactics.

Because of EST's capability to support squad-level training, and the potential payoff in time savings that could be realized from this economy of scale, the ARNG is interested in exploring the use of EST at home station locations. To this end, data were needed to assess the feasibility of using EST for training purposes as well as for fulfilling yearly soldier rifle marksmanship qualification requirements, as proposed under limited circumstances by the Air Force (Air Force Security Police Agency, 1992). While past research had shown that EST can support effective training of rifle marksmanship (Scholtes & Stapp, 1994) and defensive tactics (Eisley, Hagman, & Ashworth, 1990), no information was available on the relation between device-based marksmanship performance on EST and live-fire marksmanship performance on the range and the capability to predict the former from the latter. Not only would such a predictive capability save time and ammunition, but it would also reduce the current need to use outdoor range facilities for live-fire-based rifle marksmanship evaluation in states where access to such facilities is limited. In addition, knowledge of this predictive capability was needed before an informed decision could be made to replace range-based qualification with EST-based qualification on even a limited basis.

The objective of recent ARI research, therefore, was to (a) identify the relation between EST- and range-based rifle marksmanship performance, (b) assess the extent to which EST-based performance can be used to predict range-based performance, and if possible, (c) develop a practicable EST-based tool for ARNG company trainers to use in predicting the range-based rifle marksmanship qualification scores of individual soldiers.

What Was Done

To meet this objective, 102 soldiers from a western state mechanized infantry battalion underwent rifle marksmanship testing on the EST within 24 hr of firing for record on the range. Depicted in Figure 2-4, EST uses a combination of analog and digitized video, synchronized, multi-screen, wide-image projection, laser hit-detection, and microcomputer technology to present a variety of target arrays and courses of fire. For each exercise selected, EST displays proportionately correct scaled targets on a 2.44m (8') high x 9.14m (30') wide screen. Targets are engaged with laser-fitted, demilitarized M16A2 rifles designed to simulate the recoil and sound of real weapons firing live ammunition.

Simulated record fire on EST replicated the targeting sequence to be experienced later on the live-fire range. After zeroing their weapons, soldiers were presented with a total of 40 scaled targets (E- and F-Type) in two groups of 20 targets each. The scaled targets varied in range from 50 to 300m and disappeared from the screen when hit or with elapse of the prescribed exposure

time. All firing was done in separate lanes from a prone unsupported position with shot location feedback provided by means of replay after presentation of each 20 target group. Up to 12 soldiers fired at a time under instructions to fire only one round at each target. The number of hits observed for each group of 20 targets, as well as the total number of hits obtained out of the 40 possible, were scored automatically by the device.

In accordance with procedures specified in Field Manual 23-9 (Headquarters, Department of the Army, 1989), all soldiers fired for record outdoors on an Army-certified record fire range equipped with pop-up E- and F-Type silhouette targets that fell when hit or upon elapse of the prescribed exposure time. Soldiers were assigned at random to one of five firing lanes on which a total of 40 targets, varying in range from 50 to 300m, were presented in two, 20-target groups. The first group was fired from the foxhole supported position, whereas the second group was fired from the prone unsupported position. The total number of hits, out of the 40 possible, was the measure of rifle marksmanship performance used as the to-be-predicted criterion measure of proficiency. Record fire scores associated with specific shooting classifications were as follows: 0-22 Unqualified; 23-29 Marksman; 30-35 Sharpshooter; 36-40 Expert.

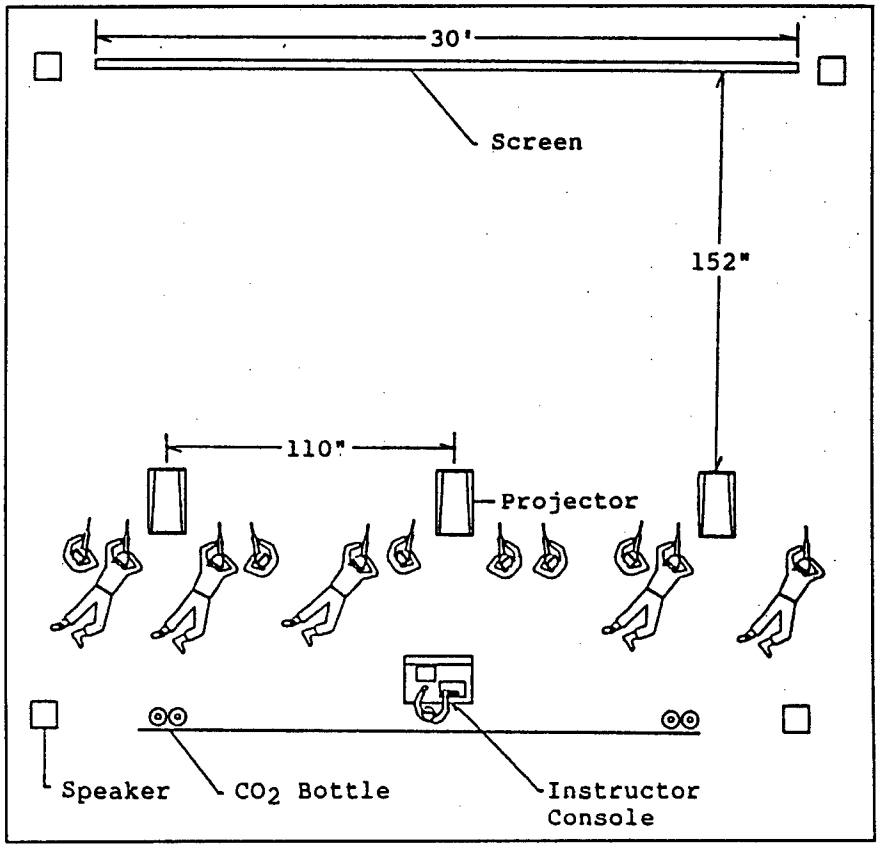

Figure 2-4. Depiction of EST.

What Was Found

The results of split-group cross-validation procedures identified, as well as confirmed, the presence of a positive linear relation between EST and live-fire marksmanship performance. Subsequently, a significant linear relation, $Y' = 18.21 + .56(X_1)$, $\underline{SE} = .06$, $\underline{F}(1, 100) = 84.77$. was found for the pooled sample between EST test and record fire performance (see Figure 2-5 for the scatterplot and best fit regression line), $\underline{F}(1, 49) = 45.58$. In addition, the correlation ($\underline{r} = .68$) between predicted and actual record fire scores was significant, with the former accounting for nearly half of the variance in the latter ($\underline{r}^2 = .46$, adjusted $\underline{r}^2 = .45$). Thus, EST test scores were both linearly related to, and reasonably good predictors of, record fire criterion performance.

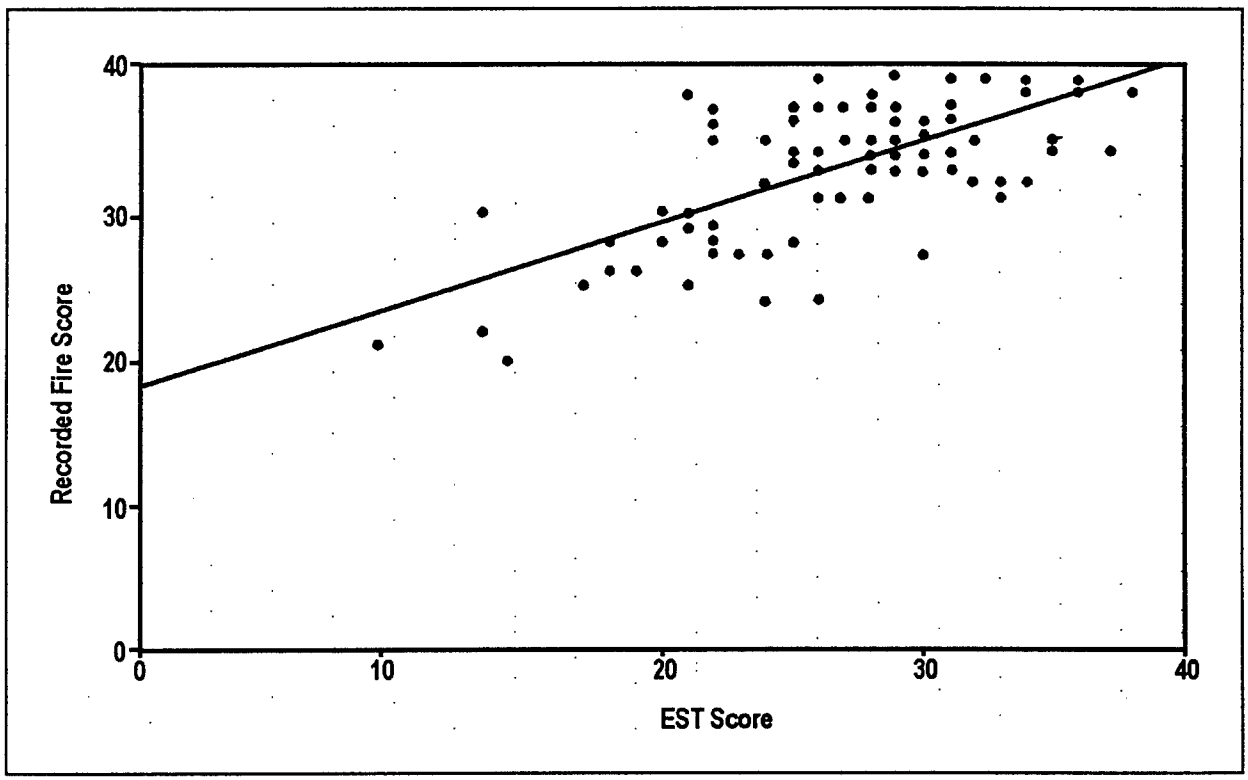

Figure 2-5. Relation Between EST and Record Fire Scores for Pooled Data.

Based on this regression equation, an ARNG trainer can predict that soldiers with an EST test score (X_1) of 9, for example, will on the average demonstrate a minimum record fire qualification score (Y') of 23. Similarly, it can be predicted that on the average an EST score of 21 will be associated with the minimum Sharpshooter record fire score of 30, and an EST score of 30 will be associated with the minimum Expert record fire score of 35. Assuming that the actual probability of firing these predicted record fire scores will follow a normal distribution with $\underline{M} = 23$ and $\underline{SE}_{ind\ y} = 3.53$ (Marksman), $\underline{M} = 30$ and $\underline{SE}_{ind\ y} = 3.46$ (Sharpshooter), and $\underline{M} = 35$, $\underline{SE}_{ind\ y} = 3.42$ (Expert) (see Hays, 1963, p. 523), the probability of an individual soldier firing a record fire score greater or equal to 23, 30, and 35, respectively, was calculated for a selected

range of potential EST test scores. Table 2-7 shows this range of EST test scores (Column 1) along with their predicted mean record fire scores (Column 2) and the associated probability of scoring ≥23, 30, and 35 on record fire (Columns 3-5). Using this table, a unit trainer can predict that a soldier with an EST score of 12, for instance, will on the average fire a record fire score of 25 and have a 70% chance of successful first-attempt record fire qualification at the Marksman level.

Table 2-7. EST-Based Tool for Predicting the Probability of Firing Record Fire Qualification Ratings of Marksman (≥23), Sharpshooter (≥30), and Expert (≥35).

EST Test Score	Predicted Mean Record Fire Score	Probability (%) of Record Fire Score ≥23	≥30	≥35
0	18	10	--	--
3	20	20	--	--
5	21	30	--	--
7	22	40	--	--
9	23	50	--	--
10	24	60	--	--
12	25	70	--	--
13	26	--	10	--
14	26	80	--	--
16	27	--	20	--
17	27	90	--	--
18	28	--	30	--
20	29		40	--
21	30	--	50	--
22	31	--	--	10
23	31	--	60	--
24	32	--	70	--
25	32	--	--	20
26	33	--	80	--
27	33	--	--	30
28	34	--	--	40
29	34	--	90	--
30	35	--	--	50
32	36	--	--	60
33	37	--	--	70
35	38	--	--	80
38	39	--	--	90

Conclusions

These findings show that (a) a positive linear relation exists between simulated rifle marksmanship performance on EST and live-fire rifle marksmanship performance on the range, and (b) this relation is consistent enough and of sufficient magnitude to support development of a practicable EST-based tool for predicting the probability of successful first-attempt M16A2 rifle qualification at the Marksman, Sharpshooter, and Expert levels.

The resulting prediction tool can serve as a diagnostic instrument for helping ARNG commanders and trainers make quick and accurate assessments of the readiness of individual infantry and support unit soldiers for record fire qualification before their arrival on the range, thereby maximizing the payoff from each soldier's live-fire experience while conserving live-fire ammunition in the process. It also provides an empirically derived set of marksmanship performance probabilities for use in determining record fire qualification standards on the device. Such standards in the form of cutoff scores would be required should the ARNG decide to use EST-based scores in lieu of range-based scores for purpose of yearly qualification. For example, it might be determined that for soldiers to receive a live-fire record fire qualification rating of Marksman (i.e., >23) they must shoot an EST score associated with a predicted 80% probability of successful qualification on the range (i.e., 14). Analogous standards could also be set for the Sharpshooter and Expert levels.

In summary, this research provides ARNG unit trainers with an initial easy-to-use tool for predicting range-based rifle marksmanship performance on the basis of simulated record fire performance on the EST, for identifying soldiers in need of remedial training prior to their arrival on the range, and for supporting the notion of using EST for purposes of yearly rifle marksmanship qualification firing when access to outdoor range facilities is limited.

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Collective Training

In response to the RC's need to train and sustain tactical collective skills required to fill increasingly important roles in the Army's force mix, Congress has mandated the Reserve Component Virtual Training Program (RCVTP) to design and develop structured simulation-based tactical scenarios for use in training RC units. Described below is what ARI has done recently to assist in the development of these scenarios.

What Was Done

An extensive set of structured training scenarios/exercises and after-action review (AAR) materials were developed to support training during 3-day MUTAs to be conducted at the Mounted Warfare Simulations Training Center (MWSTC) at Fort Knox, KY (Campbell, Campbell, Sanders, Flynn, & Myers, 1995). Exercises are conducted using a linkage of simulation networking (SIMNET) compartments that replicate the inside of Abrams Tanks and Bradley Fighting Vehicles. In these SIMNET compartments, crews can view the battlefield, maneuver their vehicles, and engage threat forces.

The training materials focus on the execution phase of the battle, rather than the planning or preparation phases. The execution phase was chosen for two reasons. First, synchronization and integration of battlefield components during the execution phase are difficult to master under any circumstance, but are especially difficult given ARNG constraints on access to maneuver training areas. Second, the development of simulation training on execution is especially demanding in terms of time and technological expertise to produce the desired force-on-force engagements.

A total of 103 RCVTP exercises have been developed for platoon, company, and battalion levels. The platoon and company exercises, called *tables*, are designed as sequential segments of two battalion missions--Movement to Contact and Area Defense. Each exercise incorporates a prepared operations orders (OPORDs) with supporting graphics, actions of a standard opposing force (OPFOR), and complete instructions to set up the simulation.

The sequential nature of the exercises is shown in Table 2-8, which summarizes the 18 tables for the tank platoon (Turecek, Campbell, Myers, & Garth, 1995). Consider, for example, the series of related exercises identified as C1, C2, and C3. All cover tactical movement, actions on contact, and attack by fire. The scope of the easiest and the most difficult of the three tables is shown below:

- ***C1 (Easier):*** This table focuses on the platoon leader's ability to command and control in changing tactical situations experienced during a mission to establish a blocking position. A small enemy ground element is encountered.

- ***C3 (More Difficult):*** This table focuses on fire control and the ability to react to a rapidly changing situation. The platoon attacks by fire, reacts to indirect fire, moves in column along a specified route, and executes actions on contact. Both an enemy ground element and anti-aircraft systems are encountered.

Similar sets of tables have been developed for the mechanized infantry platoon, scout platoon, tank company, tank and mechanized infantry company/team, and cavalry troop.

Table 2-8. Relative Difficulty Levels of Tank Platoon RCVTP Tables.						
Difficulty	***Fundamentals***	***Offense***			***Defense***	
Easier	A1					
	A2, A3	B1			E1	
		B2	C1		E2	F1
		B3	C2	D1	E3	F2
			C3	D2		F3
More Difficult				D3		

The simulation portion of the tables typically can be completed in about an hour, with AARs provided afterward. Observer/controllers (O/Cs) monitor performance and conduct the AARs using workstations which allow the viewing, recording, and play back of the complete battlefield, both in a plan view that mimics typical military graphics and in a virtual reality view that depicts friendly and threat vehicles on the terrain of the battlefield. Tables can be run back-to-back to step sequentially through a battalion mission. Each successive table introduces new tasks and repeats some tasks from the previous table. Thus, the series of tables creates a learning cycle of practice, feedback, and repeated practice. During test trials of the tables, units were able to conduct up to six tables in an extended day of training (12 to 14 hr).

The exercises for the battalion and battalion task force are run from the unit's crossing of the line of departure to the resolution of the battle (because the complex relations between the OPFOR and all maneuver forces did not allow partitioning the missions into tables). Maneuver forces operate in the SIMNET compartments; the battalion staff operates in areas laid out like command posts. Radios provide the communications linkages among the approximately 200 participants. A series of AARs follows the execution, beginning at the company level and ending with the full battalion. With the assistance of the monitoring and playback technology, O/Cs are able to complete the series of AARs in about 3 hr. In an extended training day, two repetitions of a battalion exercise are possible.

What Was Found

The instructional effectiveness of the RCVTP collective training tables was assessed for platoons and companies by Shlechter, Bessemer, Nesselroade, and Anthony (1995). They included data from three sources: (a) direct observation of 45 tables, (b) ratings by 14 O/Cs of 38 units (33 from the ARNG) executing 187 exercises, and (c) surveys of 280 commanders and soldiers who participated in the training. As summarized in Table 2-9, evaluators found that, typically, units took less time, made fewer errors, and needed less coaching as their training progressed. This pattern occurred even though the tables tended to become more difficult.

Table 2-9. Means and Standard Deviations of the Units' Time in Min, Error Rates, and Coaching Scores for Successive Training Tables.							
Table		***Time in Min***		***Error Rate***		***Coaching Score***	
	n	M	SD	M	SD	M	SD
First	9	85.22	30.40	12.89	4.81	8.44	5.27
Second	9	52.00	23.04	6.11	2.93	4.22	3.03
Third	8	40.88	10.51	5.00	2.44	3.75	2.81
Fourth	8	41.00	12.59	6.38	4.43	5.25	3.99
Fifth	7	37.57	20.33	5.14	2.79	3.42	2.14
Sixth	3	32.00	10.44	1.67	.58	2.00	1.73

The analysis of O/C ratings included examination of subtask proficiency across tables. Each time a subtask was required, O/Cs indicated whether subsequent training should focus on improving or on sustaining proficiency. A total of 359 subtasks had at least two ratings. More than half of the initial ratings indicated proficiency (train to sustain). Of the 137 cases where the initial rating indicated a problem (train to improve), 67% were eventually rated as train to sustain. Only about 14% of the subtasks showed a decline in performance. This pattern of improvement is shown graphically in Figure 2-6.

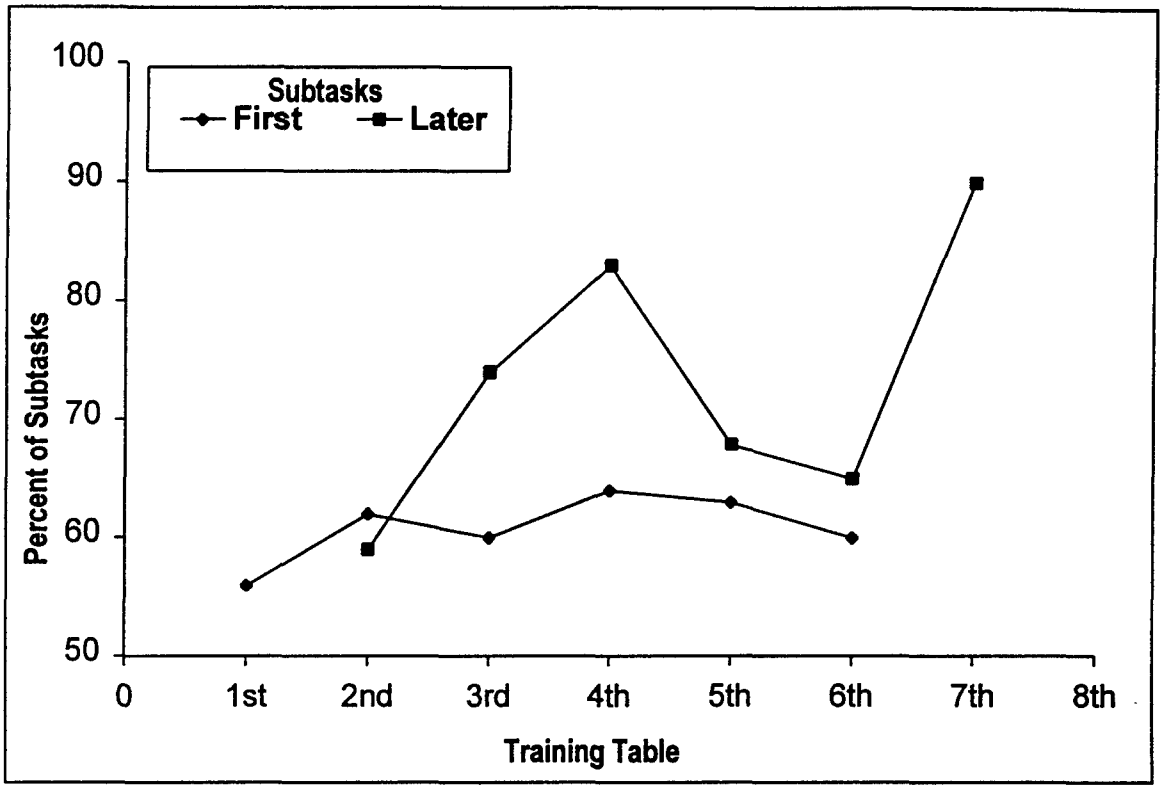

Figure 2-6. Percent of "First" and "Later" Subtasks with "Train to Sustain" Ratings by Successive Training Tables.

Questionnaire responses also showed evidence that RCVTP-based training helped units improve their tactical performance. Unit leaders (company commanders, platoon leaders, and NCOs) and a small sample of crewmen assessed their own units' proficiency both before and after RCVTP training. Across all units, the initial proficiency rating on a seven-point scale (7=extremely proficient) was 3.96; proficiency after training was rated at 5.44. Because the company level exercises included six ARNG and four AC armor companies, the company level self-assessments gave a chance to compare perceptions for the two components. As shown in Figure 2-7, the perceived level of proficiency within the ARNG armor companies before RCVTP training was lower than among leaders in AC companies. After training, both assessments increased, with the ARNG assessment being very close to the initial assessments by the AC leaders.

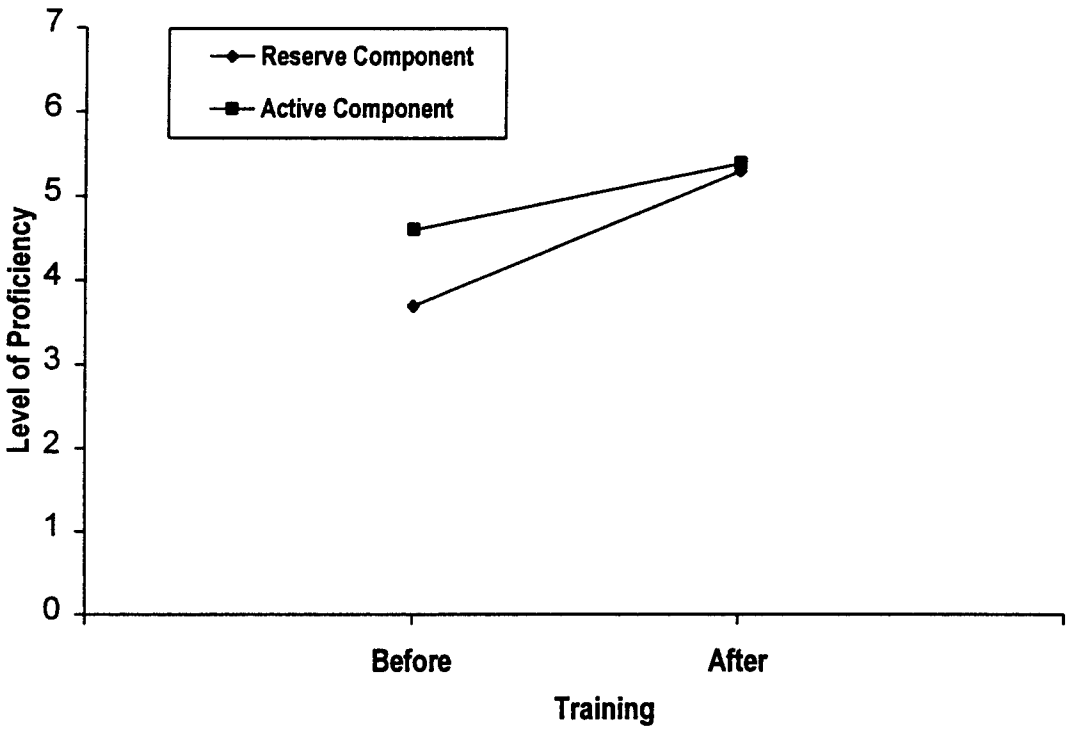

Figure 2-7. Means of Proficiency Estimates by Unit Leaders from RC and AC Armor Companies.

The effectiveness of the battalion level exercises has not been examined as formally as the effectiveness of platoon and company tables. ARI did, however, obtain feedback from trial units to assess whether the RCVTP SIMNET-based exercises provided effective training. Hoffman, Graves, and Koger (1994) reported that the ARNG and AC participants in the battalion and battalion task force exercises found that the RCVTP exercises provided much more training benefit than previous SIMNET training. Strengths cited by the participants included AAR quality (especially the focus on improvement), quality of the OPFOR, appropriate difficulty levels, and incorporation of the turn-key concept--which allowed the leadership to participate in training rather than run the exercise.

The name of the RCVTP has been changed recently to the Virtual Training Program (VTP) to reflect its use by the AC. Recent additions to the program include scenarios to link with brigade exercises, addition of the mortar platoon, and incorporation of combat service support personnel.

Conclusions

The scenarios developed by ARI, combined with the quality work of Army O/Cs, have made structured collective tactical training available to ARNG platoons, companies, and battalions. The scenarios and operation of the VTP are explicitly designed to support conduct during an IDT weekend. As evidence of the high opinion of that training, 22 ARNG battalions

have conducted exercises between October, 1993 and September, 1996. In addition to conduct during IDT, a cycle of multi-echelon training can be conducted during AT (Turecek et al., 1995).

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Staff Training

The skill of the battle staff is one of the key determinants of combat effectiveness at the combat training centers (CTCs) (Keesling, Ford, & Harrison, 1994; Thompson, Pleban, & Valentine, 1994). The major difference between effective and ineffective staffs is their level of integration. That is, their ability to obtain and share information, make decisions, and perform as a team A staff is defined as an executive officer (XO), personnel officer (S1), intelligence officer (S2), operations and training officer (S3), S3 air, logistics officer (S4), and fire support officer (FSO). Because of the importance of staff integration, the RCVTP has included simulation-based training for ARNG battle staffs. This section describes ARI work in support of RCVTP-based training of the battalion battle staff.

What Was Done

ARI developed materials for two battle staff training simulations. The first simulation is the Janus-Mediated Staff Exercise (JMSE), which trains the full battalion staff, including supporting staff sections, in command post (CP) operations. The second simulation is the Commander/Staff Trainer (C/ST) which trains staff officers in information management and staff coordination.

JMSE-Based Exercise. JMSE was developed to be compatible with SIMNET-based battalion level tactical training. Like the exercises for SIMNET, JMSE focuses on the execution phase of Movement-to-Contact and Defense-in-Sector missions, both conducted on simulated NTC terrain. The battalion being trained operates the Main CP and the Combat Trains CP (CTCP). The Main CP includes the S2, S3, S3 section, and the FSO; the CTCP includes the S1 and the S4.

JMSE exercises are conducted by the Exercise Control (EC) Group and the Observers. Members of the EC Group operate the Janus workstations and replicate subordinate and supporting units, OPFOR, and brigade headquarters. The subordinate and supporting unit controllers respond to directions from the CP/CTCP much like real units would. Observers record events and provide feedback to the participating unit.

Besides designing the structure for JMSE, ARI developed the extensive materials needed for the framework of the exercise, to include planning materials for the battalion task force (TF) and the simulated brigade. For the battalion TF, materials include a full operations order (OPORD), the TF commander's intent, a decision support template, and overlays. To enable interaction with higher headquarters, the brigade materials include a brigade OPORD with appropriate annexes, scripted message traffic, and guidance to deal with unscripted situations.

One of the goals for JMSE is to replicate an intelligent, doctrinal OPFOR. To help meet this goal, ARI developed an OPFOR scenario. The scenario includes contingency plans, commander's intent, adjacent unit activities, reinforcement options, priority of fires, and decision points.

To support control of the exercise, ARI developed individual workbooks for each of the nine controllers required to conduct JMSE-based training. The workbooks include guidance on operating the workstations as well as information specific to each exercise. In order to ensure systematic feedback, ARI also prepared workbooks for the Senior CP Observer, the three observers who monitor activities in the Main CP (S3/S3 section, S2, and FSO), and the S1/S4 Observer in the CTCP. The observer workbooks include training objectives for known events or scripted message traffic as well as for recurring tasks (e.g., maintaining logs) (Campbell et al., 1995).

Commander/Staff Trainer. The C/ST is intended to train procedures needed to process information within the context of a movement-to-contact mission. The exercises involve the battalion commander, XO, S1, S2, either the S3 or the S3 air, S4, and FSO.

C/ST exercises are conducted on a local area network (LAN) that permits staff officers and the battalion commander to exchange digital information over a radio network (e.g., the command net) or to other members of the staff. A C/ST workstation is shown in Figure 2-8. The map display allows staff officers to create and edit digital overlays similar to acetate overlays used in the field. The message monitor enables participants to receive incoming reports, view the details of a report, create new reports, copy a report to a folder, or forward a report to another workstation or over a network. Observers/controllers can adjust the difficulty of the exercise by controlling the speed of the incoming reports.

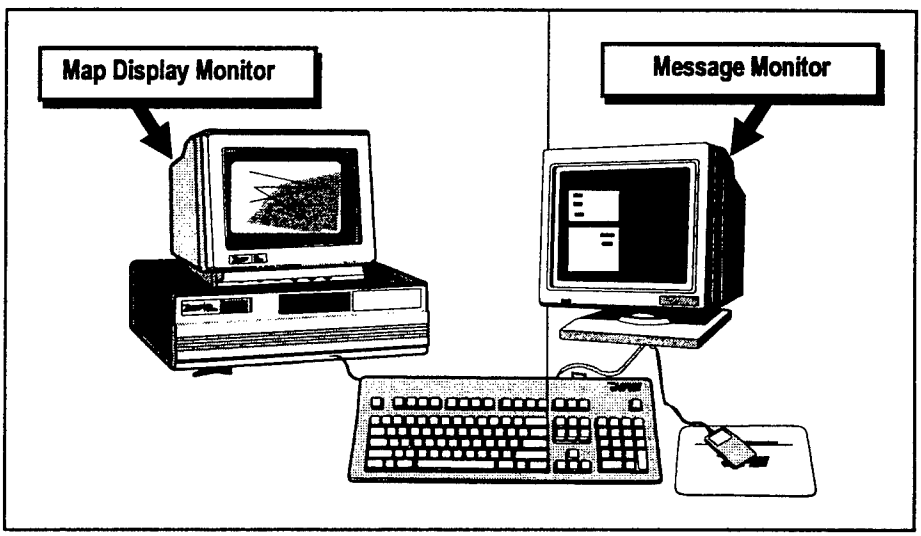

Figure 2-8. Example of a C/ST Workstation.

ARI developed the tactical situation for a Movement-to-Contact mission and prepared all messages associated with its execution. Because the tactical situation was scripted, ARI was also able to develop very detailed AAR materials. These materials were based on extensive reviews by subject matter experts (SMEs) of how they would respond to the message, including updating the situation map. The C/ST technology allows trainers to compare the message actions, situation reports, and overlays developed by staff officers being trained with the SME versions after each segment of the Movement-to-Contact mission.

What Was Found

JMSE-Based Exercises. The opinion of the staff officers who tried out the JMSE materials was that the training improved skills necessary for task performance (Hoffman et al., 1995). Officers from one ARNG battalion noted that they could see improvements in their performance after transitioning from JMSE to collective tactical training (using SIMNET). In comparing JMSE with other staff training, the officers noted that they had not conducted any CP exercise in 3 years, much less one as realistic as JMSE.

The experience in the tryouts confirmed that both the movement-to-contact and defense-in-sector missions could be conducted within the time available during a MUTA 5 IDT weekend. The recommended schedule is shown in Table 2-10.

Table 2-10. Sample of MUTA 5 IDT Weekend for JMSE.

Friday Night		
	· Receive orientation from the RCVTP JMSE team	1.0 hr
	· Begin preparing the JMSE CP/CTCP for the exercise	
	· Review orders and plans	
Saturday		
	· Complete CP/CTCP preparation	1.0 hr
	· Conduct orders brief/rehearsals	1.0 hr
	· Execute JMSE Movement-to-Contact Exercise	1.5-2.0 hr
	· Conduct AARs	2.5 hr
Sunday		
	· Complete CP/CTCP preparation	1.0 hr
	· Conduct orders brief/rehearsals	1.0 hr
	· Execute JMSE Defense-in-Sector Exercise	3.0-3.5 hr
	· Conduct AARs	2.5 hr

C/ST-Based Training. Tryouts of C/ST confirmed the efficiency of the simulation for providing experience on compiling, interpreting, and assimilating information. In addition, the combat reports used in C/ST served as models, increasing the likelihood that staff officers would request additional information from their supporting units in a standard tactical CP (CST Staff, 1994). The C/ST exercise was found to be suitable for a MUTA 4 IDT weekend.

Conclusions

As a result of the ARI support of JMSE and C/ST, ARNG units have the ability to conduct progressive staff training: low-difficulty training of staff groups using C/ST followed by a demanding, realistic full-staff exercise using JMSE. The training under both simulations has been designed to accommodate the time constraints faced by ARNG units. The name of the RCVTP has been changed to the Virtual Training Program to reflect its utilization by the AC. In addition, the name of the C/ST has been changed to the Staff Group Trainer (SGT). Work on the SGT is continuing to enhance the effectiveness of the system and to extend its application to brigade level operations and to cover deliberate attack and defense missions.

Product References

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Related References

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Computer-Based Instruction (CBI) for Battle Staffs and FSB Companies

Another promising approach to dealing with limited training time and lack of access to operational equipment in the ARNG has been the use of CBI. The recent emphasis on CBI in ARNG training has been in response to the simulation in training for advanced readiness (SIMITAR) program. SIMITAR was established by Congress in 1992 to use advanced training technologies and methods to increase training readiness in the ARNG combat brigades. ARI has conducted two initiatives with CBI under SIMITAR. The first initiative has developed opportunities for officers to learn battalion and brigade staff skills locally and on demand. The second initiative has developed opportunities for combat service support (CSS) units and individuals to practice their skills locally at home-station armories or reserve centers (Krug & Pickell, 1996).

What Was Done

ARI assembled teams of SMEs, instructional designers, and CBI experts to develop individual training exercises for battle staff officers and members of CSS companies. Teams at two sites developed CBI and computer-managed instruction (CMI). One team developed instruction for the battle staff of the mechanized infantry battalion or TF and for the battle staff of the armored brigade. The other team developed instruction for staff members of the forward support battalion (FSB) and its counterpart in the separate brigade--the support battalion (SB)--as well as for NCOs and officers in FSB companies.

Battle Staff of the Mechanized Infantry Battalion/Task Force. The instruction developed for the battalion/TF served as the basis for most of the staff instruction. The materials addressed 12 staff officers: XO, S1, S2, S3, S3 air, S4, FSO, engineer officer, air defense coordinator, signal officer, chemical officer, and chaplain. In addition, common core instruction was developed to give each officer a basic understanding of doctrine; tactical employment of the battalion/TF; and the roles, missions, and capabilities of the battalion/TF.

Thirteen courses, composed of subject lesson groups, have been developed. Lessons include topics that covering specific learning objectives. The structure and scope of the instruction are illustrated by the course outline for the S3, shown in Figure 2-9 (BDM Federal, 1995).

While CBI delivered through CD ROM is the foundation for the training system, not all topics are covered by CBI. For example, the check marks on Figure 2-9 show that 3 of the 12 lessons (Mission Analysis, Course of Action Development, and Course of Action Analysis) include CBI. CBI was used where it was a superior strategy of instructional delivery, especially to present higher order cognitive tasks, complex tasks that require coordination or synchronization with other tasks, and practical application of the skill or knowledge needed (André & Salter, 1995). Because all diagnostics, assessment, measurement, and feedback are included under CBI, all courses also include CMI components. The CBI and text materials include graphics, still photographs, audio, text, and full-motion video with audio. Each course has a listing of detailed training objectives and associated professional reference materials needed to complete the instruction (BDM Federal, 1995).

Battle Staffs of Armored Brigades. The procedures and development model for the battalion-level materials were also implemented for the battle staff of the armored brigade. Besides the necessary changes in content, a course was added for the civil-military operations officer (S5) and the courses for the S1 and chaplain were combined (André & Salter, 1996). As with the battalion materials, the brigade courses are accompanied by a document that specifies the training objectives and identifies references (BDM Federal, 1996).

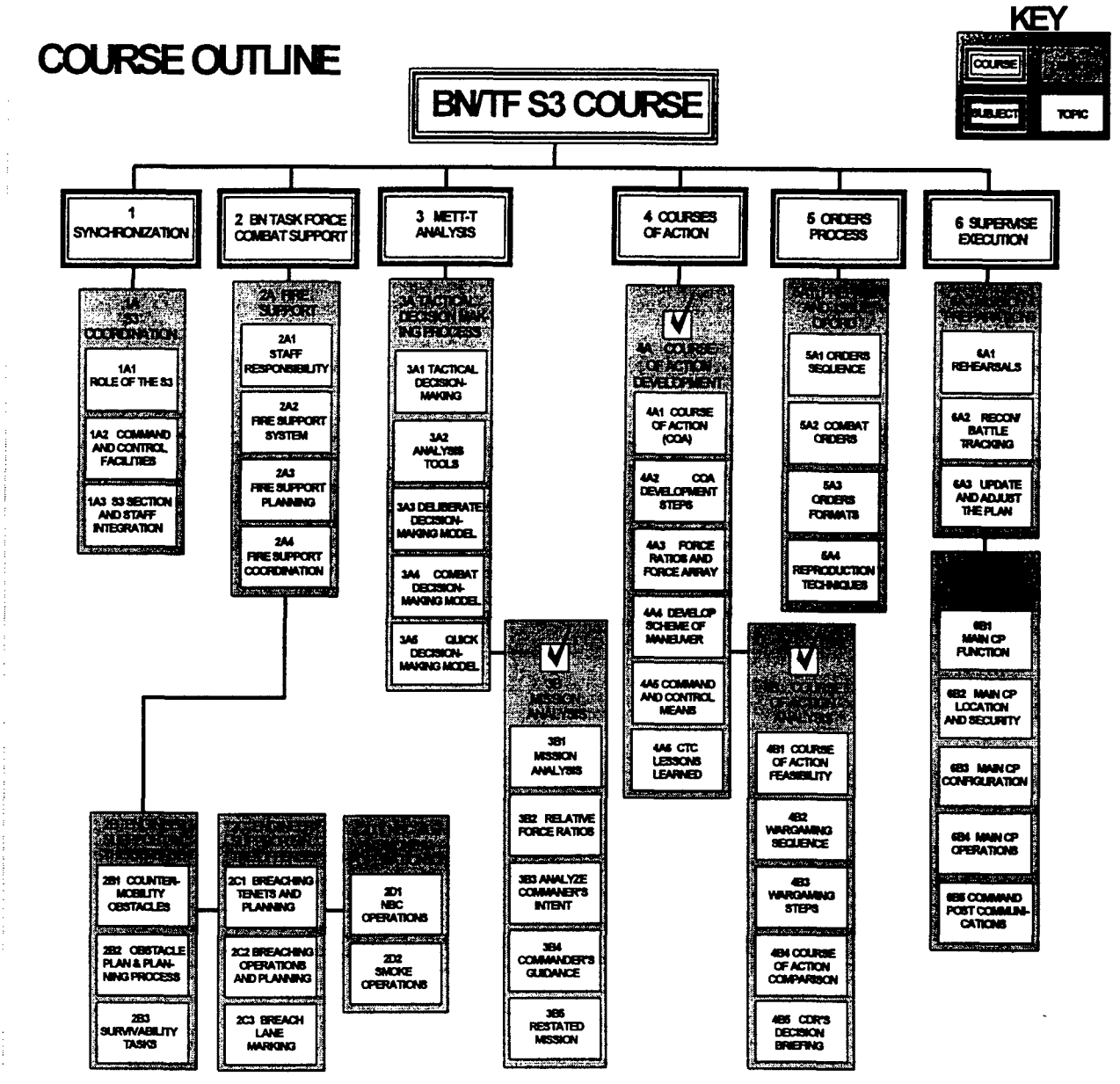

Figure 2-9. Course Map for Battalion/TF S3.

Battle Staffs of FSB and SB. The lessons developed for the mechanized infantry battalion/TF were used as the basis for the development of lessons for the FSB and SB. For most positions, ARI modified the content of the lessons to cover the requirements of the FSB and SB. Two positions, however, are unique to the FSB and SB and required new instruction. The first position is the support operations officer (SPO), who manages the CSS companies and coordinates transport and field services in the FSB. The second position is the brigade material management officer (BMMO), who manages supply and maintenance and controls the property book in the SB. Instruction consists of six lessons for the SPO, five for the BMMO, and one shared lesson. All lessons are managed through CMI. The CBI lessons provide guided practice:

interpreting information, processing it, and applying it to answer questions and perform tasks presented (with feedback) every 2 to 4 min (Deterline & Keesling, 1995).

FSB Companies. Company-level training was organized into modules to support the concept of CSS training lanes where critical tasks are arranged into a series of training stations that take the unit from the beginning to the end of a collective task (e.g., provide ground ambulance evacuation support). CBI lessons were developed to reduce the amount of hands-on training individuals would require in the lane. Members of the Iowa ARNG provided SMEs to identify the tasks and courses to be addressed and to serve as consultants to course designers and developers throughout the development work. The courses are listed in Table 2-11.

Table 2-11. List of CBI Courses for FSB Companies.

Supply Lane	A-1 Supervise Receipt/Storage of POL
	A-2 Inspection of POL Products
	A-3 Direct POL Environment and Security Controls
	A-4 Tanker Operations and Safety
	A-5 Tank Trailer Operations
Maintenance Lane	B-1 Inspect and Troubleshoot Tracked Vehicles
	B-2 Repair Diesel Power Plant/Pack
	B-3 Test and Troubleshoot Radio Sets
	B-4 Repair Traversing Systems
	B-5 Repair/Replace TOW System on BFV
	B-6 Organize and Dispatch an MST
	B-7 Battle Damage Assessment and Repair (BDAR)
Medical Lane	C-1 Control Bleeding
	C-2 Survey and Triage
	C-3 Plan for Evacuation Support
	C-4 Airway Management
	C-5 General Casualty Management
	C-6 Treatment of Wounds
Defend Sector Lane	D-1 Analyzing Terrain
	D-2 Plan Sector Defense
	D-3 Prepare Support Plan
	D-4 Prepare for Engagement
	D-5 Company Prepares for Engagement
	D-6 Organize Hasty Displacement/Disengagement
	D-7 Hasty Displacement/Disengagement Under Fire

What Was Found

During the formative evaluation of all of the courses developed, officers and NCOs worked through the materials, including pre- and post-tests. In most cases, three or four people served as test subjects for each lesson. The results of pre- and post-testing for each program are shown in Table 2-12 (André & Salter, 1995, 1996; Keesling, 1995). In all cases, the lessons appeared to provide effective training.

Table 2-12. Number of Test Subjects and Average Pretest and Posttest Scores by Program

Program	*No. of Test Soldiers*	*Average Pre-Test*	*Average Post-Test*
Battalion/TF Staff	21	63	88
Brigade Staff	43	66	91
FSB and SB CBI	15	69	87
FSB Companies	70	61	85

In addition to confirming the effectiveness of the courses, the formative evaluations provided information on time to completion. Just how long it takes to complete the instructional materials was found to vary with the initial proficiency and reading speed of the students, especially for text-based lessons. Generally, the results indicated that most of the mechanized infantry battalion/TF and brigade staff instruction will require about 60 hr, evenly divided between the common core and the position-specific instruction (André & Salter, 1995, 1996). Time requirements for the position-specific instruction will range from 6 hr for the battalion/TF chaplain to 63 hr for the battalion/TF FSO. The FSB/SB staff CBI will take about 1 hr per lesson (Deterline & Keesling, 1995). The FSB company CBI will take about 1 hr and 15 min for most lessons, but the maintenance lessons will require about 2 hr (Keesling, 1995). In all cases the authors conclude that the instruction is compatible with ARNG schedules, combining home study and instruction at the armory.

Conclusions

ARI and the ARNG have developed an enormous number of lessons to train critical staff and FSB company skills. The four efforts described in this section developed almost 300 lessons, all managed through CMI, with about 120 lessons including or solely composed of CBI. Because of the flexibility of the programs, the training can be conducted at home, in the armory or state academies for individual study via modem or in a network configuration, or at a stand-alone computer.

Product References

André, C. R. & Salter, M. S. (1995). *Battalion - Battle Staff Training System* (ARI Research 95-44). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

André, C. R. & Salter, M. S. (1996). *Brigade - Battle Staff Training System* (ARI Research Note). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Deterline, W. A. & Keesling, J. W. (1995). *Combat Service Support (CSS) Training System Development for the U.S. Army National Guard: Final Report.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

BDM Federal (1995). *Battalion Battle Staff Training System (BN-BSTS) Program Design and Critical Tasks.* Albuquerque, NM: Author.

BDM Federal (1996). *Brigade Battle Staff Training System (BDE-BSTS) Program Design and Critical Tasks.* Albuquerque, NM: Author.

Keesling, J. W. (1995). *Validation Report Lanes Training* (Contract No. 903-92-D-0075). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Related Reference

Krug, R. E., COL & Pickell, G. A. (1996). SIMITAR Sharpens the Guard. *Army*, February, 1996, 57-59.

A Remotely Conducted Command Post Exercise (CPX)

Simulations such as C/ST and JMSE increase the effectiveness and efficiency of staff training *within* a battalion headquarters. These systems allow for coordination with simulated brigade headquarters and adjacent battalions. The need still exists, however, for all battalion staffs within a brigade to work together and with brigade headquarters to develop teamwork and to refine standing operating procedures (SOPs). This need is typically met, for example, by conducting a simulated command post exercise (CPX) that involves commanders and members of the battle staff in the planning, preparation, and execution phases of a battle.

In the ARNG, a brigade-level CPX can require staffs from several states to travel to a common site (Smith, Hagman, & Bowne, 1987), imposing major travel costs in time and dollars.

This section describes ARI work with the ARNG to demonstrate that the costs of a brigade-level CPX can be reduced (with comparable effectiveness) by conducting the exercise under a remote delivery approach.

What Was Done

ARI conducted research in the late 1980s to determine the feasibility, as well as the cost, of conducting remote exercises wherein geographically dispersed units must intercommunicate from their home stations through the use of special long-distance communications equipment. Command groups from three battalion-level units (from separate states) participated in a 3-day remote CPX. CPs were established for each battalion-level unit, the brigade-level command, and the corps. During the Computer Assisted Map Maneuver Simulation (CAMMS)-driven CPX, units communicated over commercial telephones, fitted with external speakers and microphones, rather than via tactical FM radios. In addition, slow-scan TV transceivers and facsimile machines were used to transmit graphic and textual information. ARI administered questionnaires concerning the training benefit of the exercise and derived cost figures for a standard (i.e., on-site) and a remotely delivered CPX (Smith et al., 1987).

What Was Found

Effectiveness. The after action report filed by the Exercise Director of the 75th Maneuver Training Command (the controllers) stated "the communications equipment and personnel training for use of the equipment presented a challenge that most participants met admirably." This report also stated "the training objectives were met with the exception of the conduct of rear area security. This was planned for, although time did not permit its execution" (Smith et al., 1987).

Cost. Cost data revealed that substantial savings could be achieved by conducting CPXs remotely. Figure 2-10 depicts the predicted cost per exercise of a standard CPX (requiring travel to a common site) and the remotely conducted CPX (under both leased and purchased communications equipment options). These data show that a remotely conducted exercise with leased equipment would be the least expensive option if only a single exercise were conducted. Under a purchase option, the first remote exercise would be more expensive to conduct than a standard exercise because of the initial equipment investment. This investment cost could be fully amortized, however, after only two remote exercises. From then on, the cost savings would favor the remote delivery option.

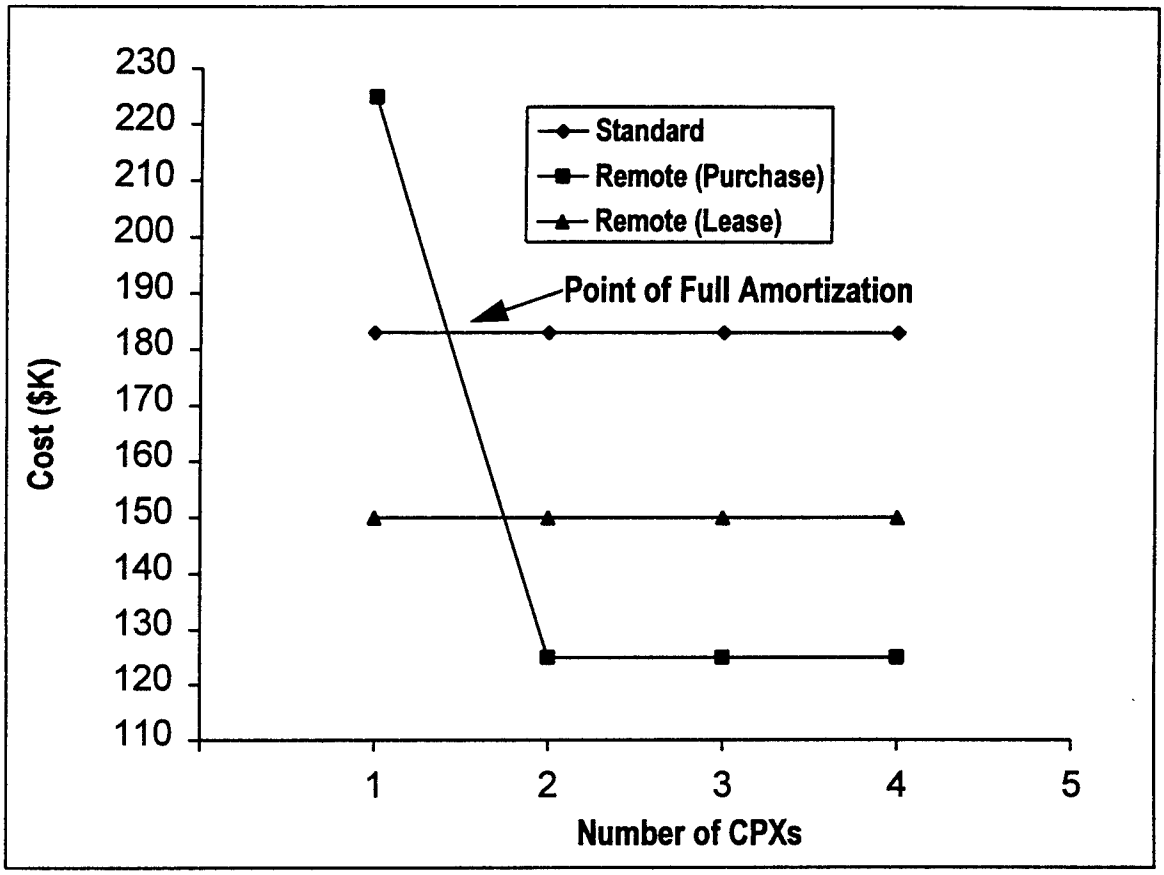

Figure 2-10. Cost Per Exercise for Standard CPX and Remote CPX with Leased and Purchased Equipment.

Conclusions

The results of this project demonstrate that remotely conducted CPXs are feasible and less costly than traditional CPXs that require travel to a common location. With the development of more capable communication equipment since conduct of this project (e.g., video teleconferencing), remotely conducted CPXs may be more cost effective than ever. Certainly, the notion of remotely conducted staff exercises is a concept that deserves further ARNG consideration.

Product Reference

Smith, G. W., Hagman, J. D., & Bowne, D. S. (1987). *Cost and Perceived Effectiveness of a Remotely Conducted Command Post Exercise* (ARI Research Report 1448). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Individual Tactical Skills

Platoon leaders (PLs) and platoon sergeants (PSGs) need an effective and efficient way to practice warfighting skills on an individual basis before they participate in resource-intensive collective training, such as an FTX or NTC rotation. Collective armor training, for example, will be enhanced if junior leaders have mastered skills required to control an armor platoon, estimate enemy actions, and plan routes, control measures, and indirect fires. The need is acute for RC PLs/PSGs, who receive few opportunities to practice such tactical skills on a regular basis. ARI's development of the RC Armor Junior Leader Tactical Training Program illustrates a way to deliver this needed training.

What Was Done

ARI developed the training program courseware designed for delivery on the Electronic Information Delivery System (EIDS). The program incorporates instructional modules supported by simulation graphics, video motion, video stills, and digitized voice and weapons effects. Feedback sessions on EIDS synchronize graphic overlays and video images with digitized voice to assess PL/PSG performance and to reinforce instructional objectives (Jones, Bullock, Henriksen, & Tkacz, 1991).

The courseware orients on the offense and is organized along three sequential, progressive modules that require the PL/PSG to maneuver the platoon, recognize Soviet organization and tactics, and plan a movement-to-contact mission. Each module includes one or two lessons and each lesson includes at least one exercise. A performance record can be printed out after each exercise.

In a formative evaluation of the courseware, eight experienced junior leaders (four PLs and four PSGs) from the ARNG worked through the four lessons over 6 weeks. Performance was assessed in terms of response accuracy and time to completion. Information on user acceptance was also gathered using a 5-point rating scale.

What Was Found

Performance was generally low and typically below established proficiency standards. As shown in Figure 2-11 (Jones et al., 1991), performance was better on fundamental tactical skills and weapons knowledge than on U.S. or Soviet tactics.

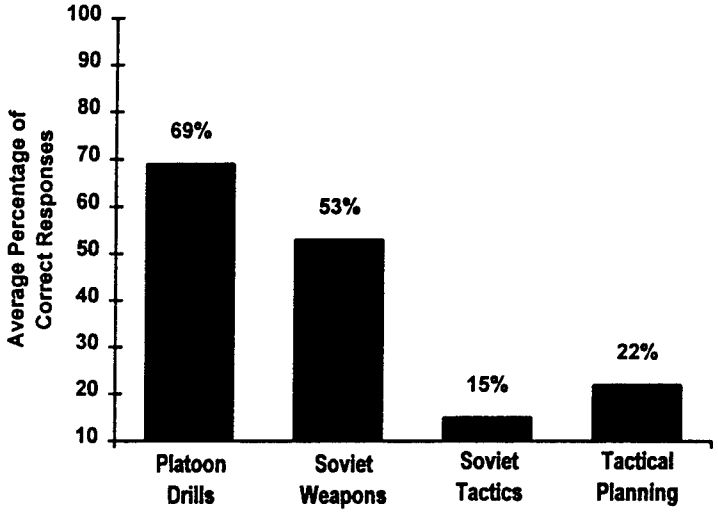

Figure 2-11. Overall Performance on Each Lesson.

The length of time for PLs/PSGs to complete the lessons ranged from about 11 to about 20 hr, with an average time of about 14 hr. Because no one reached criterion performance on all lessons, these times are probably underestimates of the time requirements.

Despite their low performance, junior leaders had high opinions of the quality of the training program. The summaries in Table 2-13 (Jones et al., 1991) show that the target audience considered the program to be (a) adequate in its coverage of tactical skills specified in module training objectives, (b) a representative simulation of the decision-making environment, (c) reasonable in the standards set for proficient performance, and (d) easy to use. The video, digitized voice, graphics, and animation sequences were rated as highly effective in supporting training objectives.

Table 2.13. Average Rating for each User Acceptance Category					
User Acceptance Category	Lessons				
	Platoon Drills	Soviet Weapons	Soviet Tactics	Tactical Planning	Combined
Adequacy of Training	4.25	4.32	4.25	4.60	4.34
Ease of Use	4.06	4.00	4.14	3.98	4.04
Functional Fidelity	4.25	--	4.12	4.50	4.29
Acceptance of Standards	4.12	4.25	4.16	4.12	4.16
Media Presentation	4.50	4.24	4.32	4.44	4.38

Conclusion

Because of the high user acceptance of the RC Armor Junior Leader Tactical Training Program and EIDS, it is reasonable to conclude that the low performance scores confirm the need for the junior leader tactical training rather than indicate deficiencies in the materials. The results should be considered a proof of principle, endorsing the practicality of multi-media interactive technology for training individual tactical skills in the RC. Further efforts are needed in two directions. The first need is to reconfigure existing courseware to incorporate the benefits of computer-generated imagery. The second need is to develop and validate additional courseware for offensive and defensive operations.

Product Reference

Jones, D. R., Bullock, M. C., Henriksen, K., & Tkacz, S. (1991). *Evaluation of the Reserve Component Armor Junior Leader Tactical Training Program* (ARI Research Note 92-07). Boise, ID: U.S. Army Research Institute for the Behavioral and Social Sciences.

CBI for Maintenance Training

Maintenance training at the organizational and the direct support (DS)/general support (GS) levels in the RC is a persistent problem under any circumstances. Because access to equipment is limited at the armories and LTAs, using the equipment for maintenance training is a low priority. In addition, because most maintenance is performed by full-time personnel at facilities such as MATES, organizational and DS/GS mechanics frequently do not get full operational responsibility for maintenance until they round out a division when mobilized or deployed to the NTC. The problems become more severe when new, typically more sophisticated, equipment is introduced and RC mechanics must be trained to maintain it. The immediate problem is that trainers and training support materials are usually not available in sufficient quantities to accommodate the geographical dispersion of mechanics. The problems compound when the equipment items are not available at all to the mechanics. Such a combination of circumstances occurred with the introduction of the M1 Abrams Tank to the ARNG.

The circumstances surrounding introduction of the M1 tank called for a CBI-based self-study program to train M1 mechanics. This section describes ARI contributions to the development and evaluation of this program. The program was called the Model Training Program for RC Units (MTP-RC).

What Was Done

Instructional designers and M1 tank SMEs developed structured courseware to be delivered via CBI. The purpose of the courseware was to train soldiers to use technical manuals (TMs) in the troubleshooting of M1 tank systems. Four MOSs were addressed: (a) 45E--M1 Abrams Tank Turret Mechanic, (b) 63E--M1 Abrams Tank Systems Mechanic, (c) 45K--Tank Turret Repairer, and (d) 63H--Track Vehicle Repairer. MOSs 45E and 63E are at the organizational level; 45K and 63H are at the DS/GS level.

About 40 CBI hours are devoted to each course. Their structure is shown in Table 2-14 (Marco, Israelite, & Gunderson, 1986). Following introductory lessons, each course is organized by tank system. For each system, the materials provide lessons on the principles of system operation and troubleshooting. The principles of operation are presented through high resolution color graphics. Each troubleshooting lesson introduces a symptom and provides an explanation of what components could be causing the symptom. The troubleshooting lesson presents a guided demonstration for troubleshooting the system and two practical exercises for the same symptom, each terminating in a different fault. The student reads the TM while troubleshooting and interacts with the computer by using a lightpen.

Table 2-14. Flow of Instruction for Each Course.				
System: (1 of 4)	Vehicle Turret Power Control	Firing Circuits	Computer	Rangefinder
Lesson 1	Principles of Operation Name-Location-Function Input-Process-Output			
Lesson 2	Troubleshooting Introduction to Troubleshooting Symptom Introduction How To Troubleshoot Exercise Guided Demo Practical Exercise 1 Practical Exercise 2			

The transfer effectiveness MTP-RC-based training was evaluated with Advanced Individual Training (AIT) students in the 63E MOS (Graham, Shlechter, & Goldberg, 1986). Sixteen soldiers who received the CBI training made fewer errors per period of time on hands-on troubleshooting tasks than did soldiers trained under conventional methods. The skills and knowledges developed in the exercises also were found to generalize to troubleshooting a task not specifically trained.

Because the MTP-RC was intended to be implemented in RC units, ARI next assessed whether the concept was effective for training and sustaining M1 tank maintenance skills in RC units over a 1-year period. Thirty-five soldiers from three RC units were given hands-on and paper-and-pencil pretests and then, a year later, corresponding posttests. In the interim, units were to conduct the training with participating soldiers for 4 hr during each IDT monthly drill. Although some training was conducted as planned during monthly drills, most training was conducted during the week and at night. In one unit, the training was massed to prepare for a rotation to the NTC. In another unit, MTP-RC training was conducted during AT. Although each course only required about 40 hr, most soldiers completed only about 60% of the lessons.

What Was Found

Despite the variations in implementation and the low completion rates, the MTP-RC was effective. The impact is shown most clearly by the hands-on test results illustrated in Figure 2-12 (Graham, 1987). Even though 45K and 63H soldiers did not have access to M1 tanks either before the pretest or during the training period, their performance showed dramatic improvement.

By chance, the sample provided an opportunity to assess whether MTP-RC was effective for experienced as well as novice mechanics. About half of the soldiers with organizational MOSs (45E and 63E) who participated in all phases of the program also had full-time jobs as MATES technicians. As shown in Table 2-15, MATES employees had much higher pretest scores than the non-MATES soldiers, but the posttest scores were similar.

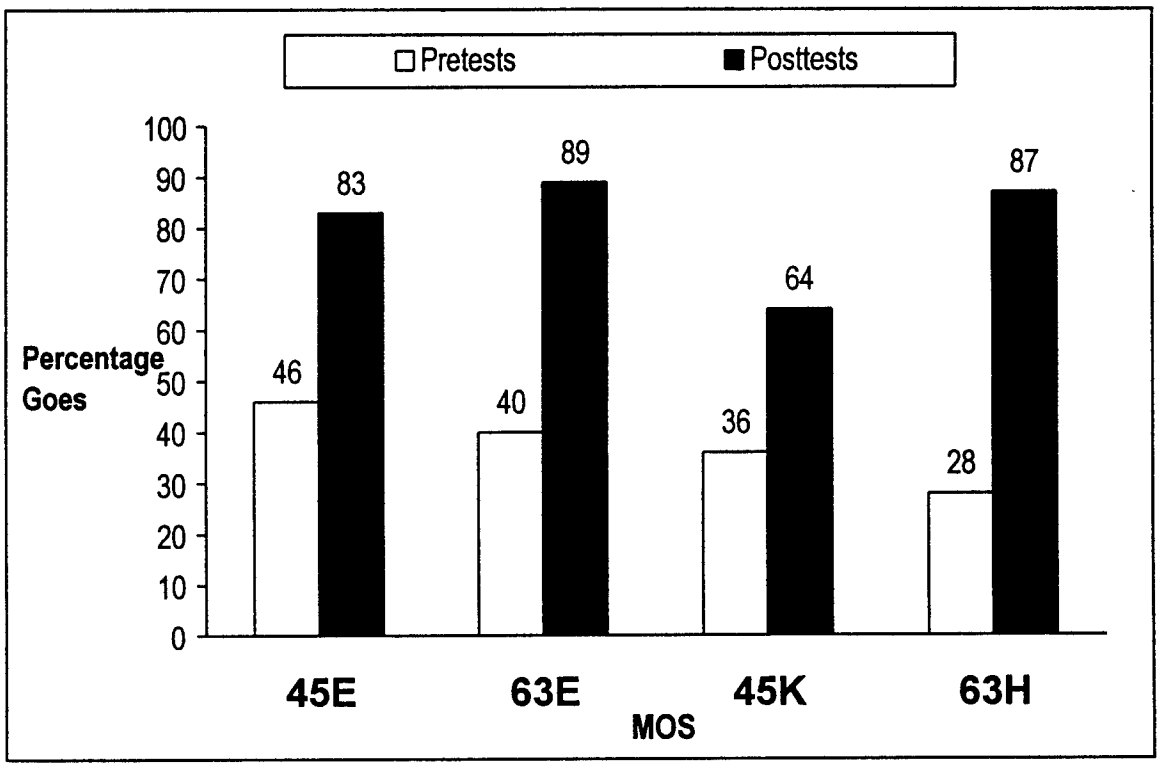

Figure 2-12. Hands-on Pretests and Posttests for Four MOSs.

Table 2-15. GO Rates of 45E and 63E Soldiers by MATES Employment.		
	Hands-on Pretest	***Hands-on Posttest***
MATES Employees (n=8)	62%	85%
Non-MATES Employees (n=7)	19%	88%

Job knowledge for the mechanics as measured by the paper-and-pencil tests was compared with recent AIT graduates who had received school training on M1 tank maintenance. Performance of the 45E and 63E RC soldiers did not differ from that of the AIT graduates on the pretest and posttest. The 45K and 63H mechanics (who did not have contact with M1 tanks) scored significantly lower before participating in the MTP-RC training than the AIT graduates. At the posttest, the gap had been reduced but generally still existed (Graham, 1987).

The evidence of the effectiveness of MTP-RC is probably less important for future training in the RC than the probable reasons for the program's success. One of the surprising results of interviews and the review of training records was that soldiers from units with M1 tanks were more enthusiastic about MTP-RC than soldiers who did not have access to the tanks. One staff sergeant MATES employee, for example, drove 52 miles each way to take the MTP-RC-based training after working all day at MATES. Graham (1987) attributes such enthusiasm to three reasons:

- The training may be more salient for soldiers with access to tanks, as they can go to the tank and try the trained procedures. The fact that the non-MATES employees in the organizational unit showed the most improvement of any subgroup suggests that CBI paired with hands-on training may be more effective for maintenance jobs than CBI alone.

- On-tank maintenance performed by the organizational mechanics is largely limited to routine checks and services. Comprehensive MOS training is rare.

- MTP-RC-based training integrates theory into the simulation exercises. Graham speculates that there may be a need to correct the neglect of theory in some criterion-referenced training.

Despite the uneven implementation, MTP-RC-based training was effective for all MOSs who participated in the field evaluation. Graham also suggests three reasons for this overall success:

- There was a real need for technical skills training in the units selected, particularly for weapon systems that are not available for training. The low pretest hands-on scores in Figure 2-13 indicate the scope of this need.

- MTP-RC trains skills that are fundamental to successful troubleshooting and maintenance performance, specifically following the actual TMs and executing exact procedures.

- The simulations require less time than the actual procedures because test equipment and components can be connected and removed with the stroke of a lightpen.

Conclusions

Even though the content of MTP-RC-based training has little current relevance, the experience of implementing the program highlights three lessons that are probably still applicable. First, the constraints for training RC mechanics call for self-study training materials. The experience with MTP-RC shows that mechanics are willing, in some cases anxious, to use such materials with even modest support from their unit. Second, CBI is an effective medium for delivering maintenance training because it enables the incorporation of theory with practice, trains fundamental skills, and reduces the time needed to perform supporting tasks. And third, the capability of CBI to manage student progress is especially valuable because it accommodates the fragmented time available for training. Implementation of CBI training should support delivery outside of IDT periods. Policy changes may be warranted to support training at home or in technology centers during the week.

Product References

Graham, S. E. (1987). *Field Evaluation of a Computer-Based Maintenance Training Program for Reserve Component Units* (ARI Research Report 1461). Fort Knox, KY: U.S. Army Research Institute for the Behavioral and Social Sciences.

Graham, S. E., Shlechter, T. M., & Goldberg, S. L. (1986). *A Preliminary Evaluation of a Model Maintenance Training Program for Reserve Component Units* (ARI Research Report 1421). Fort Knox, KY: U.S. Army Research Institute for the Behavioral and Social Sciences.

Marco, R. A., Israelite, L., & Gunderson, S. (1986). *Functional Hardware and Software Specifications for the Model Training Program for Reserve Component Units* (ARI Research Note 86-25). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

SECTION 2: Distance Learning (DL)

Part of the explanation for not deploying ARNG roundout brigades in Operation Desert Storm (ODS) was that ARNG units had a low percentage of soldiers who were MOS qualified (U.S. General Accounting Office, 1992). Two factors contribute to low levels of enlisted soldier MOS and officer branch qualification. First, only about one-third of prior service enlisted ARNG soldiers are initially matched with their active duty career fields (Ramsberger, Knerr, McKinney, Sticha, Kronholm, & Gividen, 1996). Second, RC soldiers often find it difficult to attend resident training to learn a new job or to progress in their career field. Difficulties arise because of the significant costs of resident training (the annual travel and per diem cost for RC soldier resident training is about 32 million dollars) and the inability of RC soldiers to be absent from their civilian jobs and military units for the often extended periods of time required to complete such training.

As a result of these difficulties, the Chief of Staff of the Army has directed the U.S. Army Training and Doctrine Command (TRADOC) to work toward converting all resident courses, except officer and NCO professional development courses, to a combination of resident training and DL or to all DL (TRADOC, 1996). While Army emphasis on DL has intensified only recently, ARI has been involved since the mid-1980s in studying how best to implement DL.

Asynchronous vs Synchronous Delivery

The basic question that must be answered before developing a DL course or converting a resident course to DL is whether training delivery should be done in a synchronous or asynchronous mode. Synchronous delivery requires simultaneous "real time" interaction between the instructor and the student using communications technologies such as audio conferencing and video conferencing. In contrast, asynchronous delivery does not require the instructor and student to interact concurrently. Technologies that support asynchronous delivery include, for example, CBT, interactive videodisk-based training, and computer conferencing. While both synchronous and asynchronous delivery modes are possible in most situations, the question is which type of delivery mode should be used and when.

To help answer these questions, ARI has developed an automated decision tool that assigns weights to various training course characteristics (Hagman & Dykstra, 1988). The questions asked by the decision tool and the implications of their answers in regard to delivery mode selection are summarized in Table 2-16. In general, this table shows that neither delivery mode is inherently "better" than the other and that the decision of which to use depends on the specific situation.

Table 2-16. Characteristics to Consider in Determining the Delivery Mode of DL.		
Characteristic	***Synchronous***	***Asynchronous***
Training offered:	At scheduled times.	On demand.
Distribution of trainees:	Within 1 or 2 time zones.	Across 3 or more time zones.
Number of trainees per site:	More than 10 at a time.	Fewer than 10 at a time.
Pace controlled by:	Trainers or groups of trainees.	Individual trainees and trainer.
Feedback given to:	Group.	Individual trainees or group.
Training sequence:	Fixed.	Flexible.
Training automated?	No.	Yes.
Training strategy:	Lecture. Group study.	Group study. Drill and practice. Tutorial. Simulation.

Product Reference

Hagman, J. D., & Dykstra, D. I., Jr. (1988). *User's Manual: Distributed Training Technology Selection Advisor (TECHSELECT)* (ARI Research Product 88-11). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Related References

Ramsberger, P. F., Knerr, C. M., McKinney, D. D., Sticha, P. J., Kronholm, E. A. & Gividen, R. (MAJ) (1996). *Strategic Plan for the Academic Component of the Army National Guard Distance Learning Demonstration* (HumRRO FR-WATSD-96-23). Alexandria, VA: Human Resources Research Organization.

U.S. Army Training and Doctrine Command (1996). *Army Distance Learning Program* (Operations Directive No. 1-96). Fort Monroe, VA: Author.

U.S. General Accounting Office (1992). *Replacement Brigades Were More Proficient Than Guard Roundout Brigades* (GAO/NSIAD-93-4). Washington, D.C.: Author.

Asynchronous Computer Conferencing (ACC)

ARI has completed a 5-year, programmatic research effort to determine the pros and cons of both synchronous and asynchronous delivery. Research into the latter has examined the cost and effectiveness of using ACC for branch qualification and NCO professional development courses. ACC enables trainees to communicate with an instructor and one another at different times and from different locations via computer and existing telephone networks. The approach establishes a simulated, long-distance, electronic classroom wherein the instructor conducts discussion, assigns and corrects homework, answers questions, gives tests, and provides feedback.

What Was Done

ARI examined the benefits of ACC within the context of (a) a module of the Engineer Officer Advanced Course (EOAC) and (b) the Basic NCO Course (BNCOC) common core. The EOAC module was first converted, administered, and studied in detail; then lessons learned from it were extended to BNCOC.

EOAC. The EOAC module covered nine topics, (e.g., airfield damage repair, military petroleum pipelines, asphalt production, roads and airfields, and rear operations). It culminated with a "capstone" practical exercise which placed student groups in a simulated combat environment in which they were to develop plans and then brief them to a field grade officer.

The EOAC materials were converted to an ACC format using media appropriate for DL. The percentage of course hours devoted to particular media/tasks is shown in Table 2-17 (Phelps, Ashworth, & Hahn, 1991).

Table 2-17. Media/Task Percentages.

Media/Task	*Percentage of Hours Spent*
Computer-Based Instruction	19
Team Synchronous	4
Team Asynchronous	20
Video	2
Print	41
Quiz/Exam Review	14

Table 2-18 shows the variety of media/materials that can be used in conjunction with ACC-based delivery (Hahn, Harbour, Wells, Schurman, & Daveline, 1990). It also reveals, to some extent, the level of analysis required to support course conversion. Clearly, ACC-based delivery can entail major alterations in both material and media (Phelps et al., 1991).

Table 2-18. Media Selection for Asphalt Production.	
Activity	***Medium***
Overview of mix plant and paving operations	Paper reading assignment--need to show visuals; no need for feedback during presentation
Aggregate blending	Spreadsheet exercise--has many iterative calculations so use of spreadsheet will ease student burden; one drawback is the lack of feedback during the exercise Contingency activity (anticipated for remedial instruction for the difficult subject)--computer assisted instruction (CAI) that provides feedback on each step of the exercise
Optimum asphalt content	CAI with workbook--exercise would benefit from ability to provide feedback at each step due to quantitative nature; workbook provides hardcopy materials
Bill of materials	Paper-based exercise--also calculational in nature; must design activity with internal checkpoints
Review	Asynchronous and synchronous group discussions--use a roundtable where questions are directed at each student and their answers discussed so that all must prepare for the session

The ACC course was administered to 14 RC captains and lieutenants. Each student was provided a personal computer with software and courseware loaded. The instructional staff consisted of a civilian course manager/administrator (a USAR member) who was responsible for the overall operation of the course and the supervision of supporting staff. The supporting staff consisted of four part-time instructors (all members of the USAR) who monitored student progress, directed group discussions, and conducted remedial instruction (Phelps, 1993)

During the course, students worked through the first five topics of the module at their own pace. This did not work very well. Indeed, one review concluded that "when students were allowed to proceed at their own pace, they scarcely progressed at all" (Wells, 1990, p. 38). Because of the slow progress found under self-pacing, instructor pacing was instituted. Pacing measures included establishing deadlines (with penalties and incentives) and increasing group activities. As Figure 2-13 shows, progress improved considerably after instructor pacing measures were imposed and was more consistent with initial expectations.

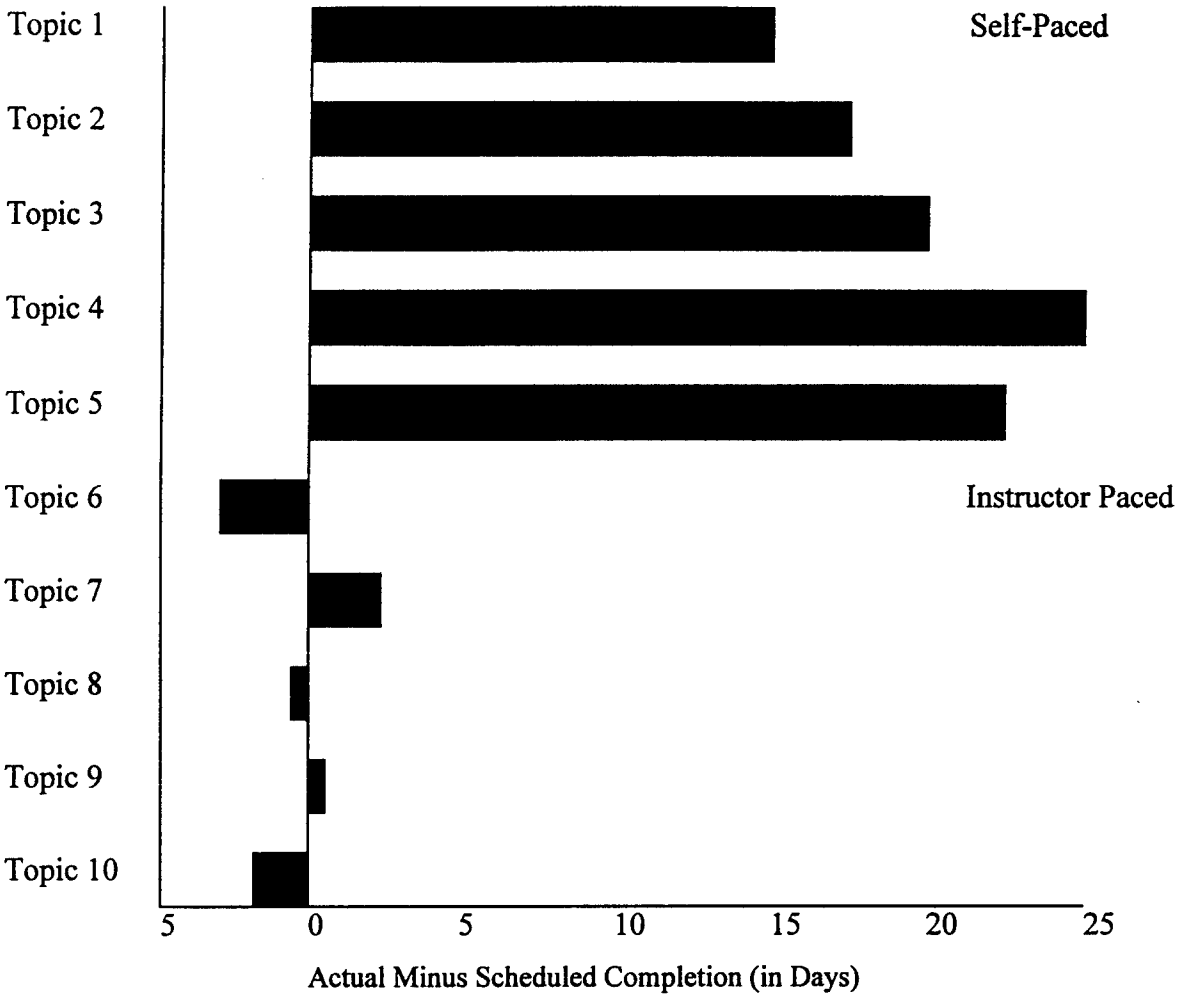

Figure 2-13. Course Progress Under Self-Paced and Instructor Paced Conditions.

A control group consisted of RC officers who were trained on the module in residence at the Engineer School during fiscal years 1987, 1988, and 1989. Data were collected on tests (n = 370), homework (n = 171), the capstone practical exercise (n = 165) and pre- and post-surveys (n = 49) (Hahn, Ashworth, Phelps, Wells, Richards, & Daveline, 1991).

BNCOC. The lessons learned from the work with EOAC were applied to the conversion of BNCOC to an ACC-based DL format. The content covered leadership skills, the promotion system, training management procedures, property accountability, and map reading. The ACC media that were used included CAI, video tapes, paper-based materials, and discussion.

Thirty one NCOs began the course under ACC delivery and the controlled pacing conditions found to work for EOAC delivery. A control group of 32 NCOs began the course as "residents" at a Reserve Forces (RF) School. Test and completion rate data were collected on both groups.

What Was Found

As shown in Table 2-19, test performance of students in both ACC courses was equal or better than test performance of resident students. In addition, EOAC ACC students demonstrated the same level of performance on homework and on the culminating capstone exercise of the module. Comparison of EOAC students' self-ratings of their skills and knowledge before and after the module completion also showed significantly greater gains for the ACC students.

Table 2-19. ACC Effectiveness.

Performance	*EOAC*		*BNCOC*	
	ACC	*Resident*	*ACC*	*Resident*
Test Scores	91%	90%	84%	75%
Completion Rates	64%	95%	90%	96%

Besides confirming that RC students can acquire requisite skills and knowledge under DL, the work with the two ACC-based courses provided valuable information on throughput, cost, and procedures for successful conduct of DL under an ACC-based delivery mode.

Throughput. Of the 14 officers who began the EOAC course, three formally dropped out prior to the start of the module and two failed to complete the assignments required for course completion. This 64% completion rate is substantially lower than the 95% throughput normally reported for resident training. The EOAC completion rate, however, was probably at the low end of what could be expected because of formative issues that would not arise under a fully developed course implementation (Wells, 1990). Note, for example, the improvement for BNCOC in the ACC mode. It should be noted also that both ACC-based courses had better completion rates than the 50% completion rate typically associated with paper-based correspondence courses (Hahn et al., 1991).

Cost. Work with the EOAC course gave ARI an opportunity to compare the costs of converting an existing course for DL with the costs of conducting resident training. The staff hours needed for converting the materials are shown in Table 2-20 (Hahn et al., 1991). Note that course development (conversion) was by far the most time consuming activity.

Table 2-20. Staff Hr Required for ACC-based Course Conversion.		
Category	***Staff Hours***	***Percent of Effort***
Course Requirements Analysis	435	10
Course Design	163	4
Course Development	2,588	61
CBI/Slide	812	19
Video Tape Production	251	6
Totals	4,249	100

The cost for ACC was calculated by adding the cost for conversion (using TRADOC training developers) to that for execution. The results were then compared with the cost of delivering resident training so that 50 students would complete each course (which accounts for the throughput advantage for resident training). The comparison over 10 course iterations (see Figure 2-14) shows that ACC would save 48% of resident costs.

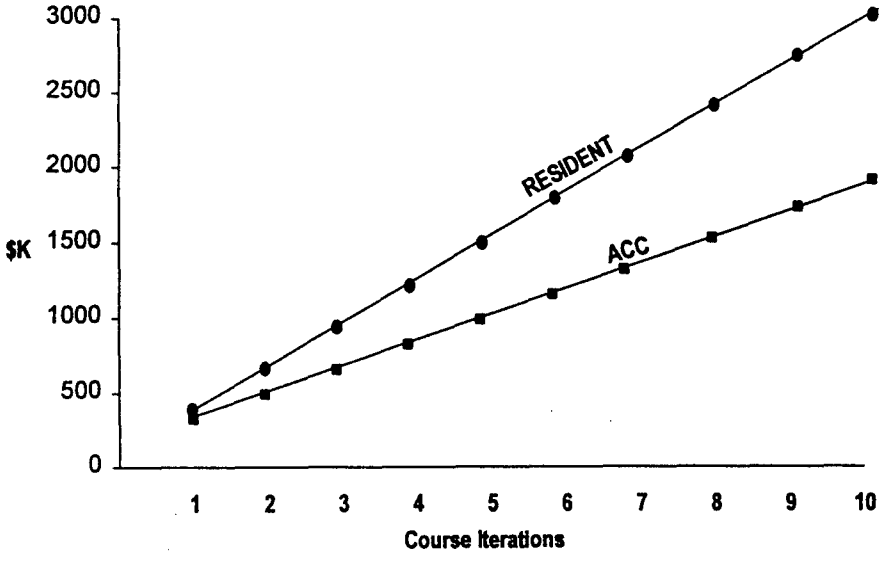

Figure 2-14. Total Course Conversion, Start-up, and Recurring Costs for 50 Students.

How to Conduct ACC-Based Training. Besides assessing the cost and effectiveness of ACC, ARI identified which procedures work best when conducting ACC-based training. In most cases the experience with EOAC and BNCOC confirmed findings derived from the general literature on DL (Wells, 1990). Five principles were identified as particularly pertinent to the use of ACC by the ARNG:

- ***Incorporate High Student-Instructor Interaction.*** For example, in the EOAC demonstration, the primary instructor received 388 telephone calls and 426 on-line communications. In addition, the instructor initiated calls and on-line contact to provide frequent feedback on assignments and tests.

- ***Establish a Flexible but Firm Schedule.*** The experience with EOAC indicated, and that with BNCOC confirmed, that deadlines are essential for keeping students moving. Deadlines must be spaced to give a reasonable amount of flexibility, but not so far apart as to encourage procrastination.

- ***Expect No More Than 10 Hr of Student Time Per Week.*** Early projections for EOAC called for students to devote 8 hr a week to the course. Experience showed that students devoted that time plus an equivalent amount of administrative time. Feedback from the EOAC and BNCOC students revealed that a total of 8 hr was an appropriate target, with 10 hr being the maximum that could be expected.

- ***Incorporate Group Activities.*** Experience in both courses confirmed that group activities were a valuable pacing aid (students did not want to disappoint other members of their group) and enhanced student motivation.

- ***Establish Incentives and Sanctions.*** For the schedule to be meaningful, there should be bonus points for early lesson completion and deductions for being late. The incentives and sanctions must, of course, be compatible with the policies of resident training.

Conclusions

As a result of the ARI work on ACC, the RC can make an informed judgment about the practicality of DL for branch qualification and professional development. The results show that an ACC course can develop skill levels comparable to those achieved via resident training with costs that are similar or less than those associated with resident training, even allowing for differences in throughput.

In addition to demonstrating the benefits of an ACC-based training approach for DL, this research has developed three products to facilitate the future use of ACC. The first is a general review of literature related to DL (Wells, 1990). The second is a job aid to assist instructors in the conduct of ACC-based training (Harbour, Daveline, Schurman, Richards, Hahn, & Wells, 1990). The third provides course developers and managers with guidance on how to implement

ACC-based training in the accordance with the Systems Approach to Training (Hahn et al., 1990).

Product References

Hahn, H. A., Ashworth, R. L., Jr., Phelps, R. H., Wells, R. A., Richards, R. E., & Daveline, K. A. (1991). *Distributed Training for the Reserve Component: Remote Delivery Using Asynchronous Computer Conferencing* (ARI Research Report 1581). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Hahn, H. A., Harbour, J. L., Wells, R. A., Schurman, D. L., & Daveline, K. A. (1990). *Distributed Training for the Reserve Component: Course Conversion and Implementation Guidelines for Computer Conferencing* (ARI Research Product 90-25). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Harbour, J. L., Daveline, K. A., Schurman, D. L., & Hahn, H. A. (1990). *Distributed Training for the Reserve Component: Instructor Handbook for Computer Conferencing* (ARI Research Product 90-24). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Phelps, R. H. (1993). *Asynchronous Computer Conferencing for Reserve Component Training*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Phelps, R. H., Ashworth, R. L., Jr., & Hahn, H. A. (1991). *Cost and Effectiveness of Home Study Using Asynchronous Computer Conferencing for Reserve Component Training* (ARI Research Report 1602). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Wells, R. A. (1990). *Computer-mediated Communications for Distance Education and Training: Literature Review and International Resources* (ARI Research Product 91-06). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Strategy For DL Implementation

The National Defense Authorization Act of 1995 directed the National Guard Bureau to establish a DL program. This is being accomplished through the establishment of regional networks having a DL classroom site within a 90-min commute for all ARNG soldiers (eventually to be within 60 min). Each site will have an audio teleconferencing station, a multi-media personal computer, an interactive graphic tablet and software, a video satellite downlink, a videotape player/recorder, and a 35" television monitor. Some sites will also include a network of 12 multi-media personal computers.

What Is Being Done

The first step being taken to establish the regional networks is to develop a demonstration network covering Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia. ARI is supporting the establishment of these networks by developing criteria for prioritizing courses for DL, developing an inventory of DL courseware, outlining an approach for shared access, and developing demonstration training.

Develop Criteria for Prioritizing Courses for DL. TRADOC has Army-wide priority for converting courses to a DL format (TRADOC, 1996). Criteria used for establishing this priority include the number of MOS-unqualified soldiers, changes to unit missions, restructuring of jobs, changes to doctrine or technology, proponent school recommendations, training load, MOS density, and the availability of existing training materials. ARI is assisting TRADOC in the prioritization process by developing a method for deciding which courses to convert on the basis of the above-mentioned criteria (Ramsberger et al., 1996). As regional networks are established, this system (see Figure 2-15) will enable leaders to select high priority courses for each region.

Develop Inventory of DL Courseware. As shown in Figure 2-15, the first step in deciding which courses to convert to a DL format is to eliminate courses that have already been developed. To help with this decision, ARI has developed a computerized listing of available DL courses. These courses were identified from sources within the U.S. Department of Defense (e.g., Defense Instructional Technology Information System), other Federal agencies (e.g., Department of Energy Central Training Academy), and commercial producers (e.g., Health Professional Database). The resulting inventory links to other databases containing over 14,000 courses and provides descriptive entries of nearly 300 training materials (Human Resources Research Organization, 1996).

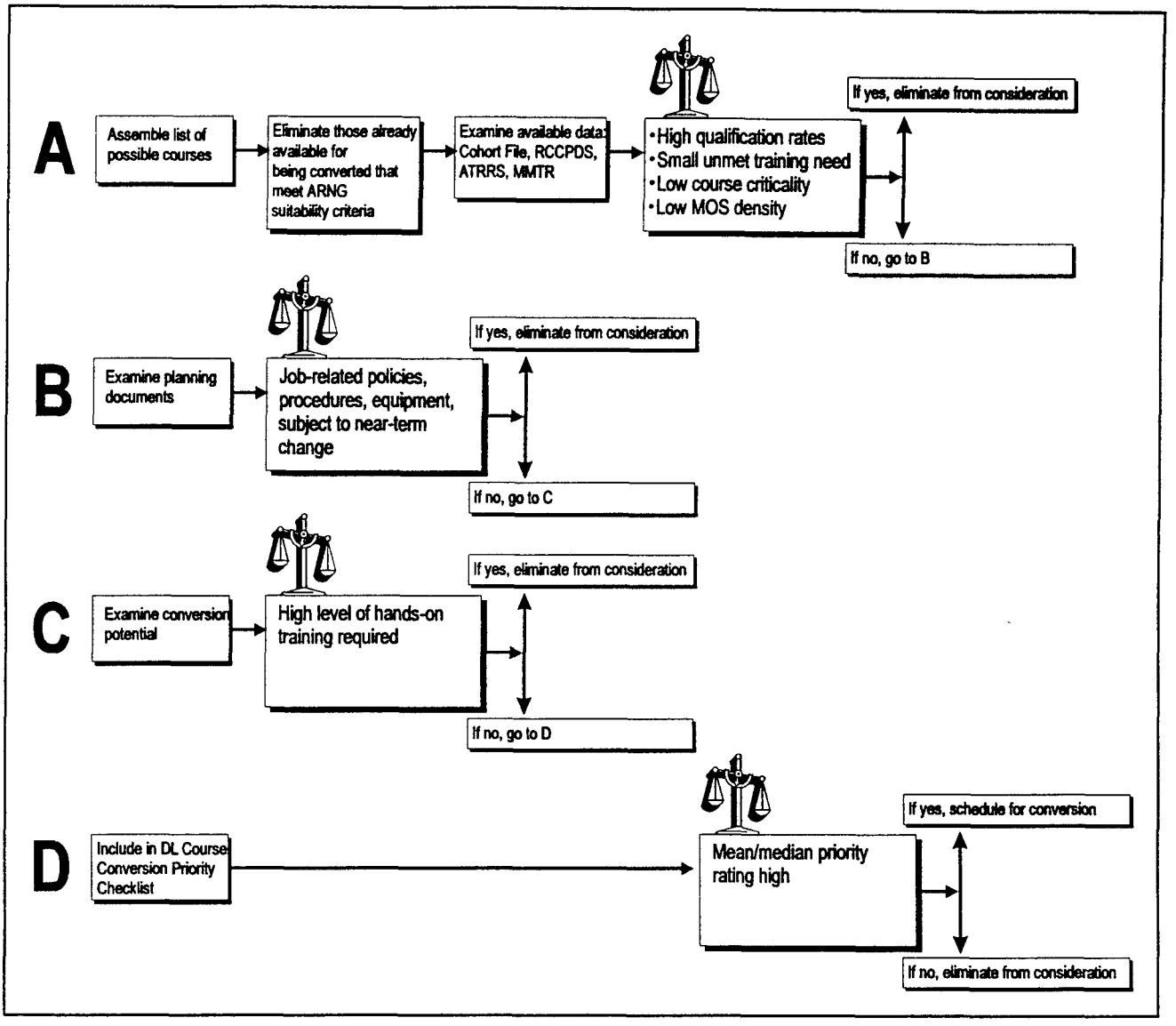

Figure 2.15. Suggested Framework for DL Conversion Decision Making.

Outline Approach for Shared Access. In acknowledgment of the central role that the ARNG plays in local communities, the plan for the DL regional network emphasizes shared usage by the ARNG and civilian organizations (e.g., to provide opportunities for continuing education). To facilitate shared access, ARI has developed guidance to involve civilians in DL at armory locations. Recommended activities include establishing a point of contact (POC) to introduce the network to the community, identifying civilian POCs, informing local media, and demonstrating network usage (Ramsberger et al., 1996).

Develop Demonstration Training. ARI support of the DL demonstration has included development and tryouts involving the delivery of functional training events and TRADOC courses.

Functional training events are satellite-delivered briefings for members of the ARNG and other government agencies. Topics have included terrorism, counter-drug operations, and risk management (which is delivered quarterly). Feedback from participants has confirmed that the information in such events can be effectively communicated using DL technologies.

ARI support for TRADOC courses has included conversion of institutional courses and development of content modules. When institutional courses are converted for ARNG use, they are restructured to fit into a maximum of 48, 4-hr blocks with no more than 15 days of accompanying resident training. For example, the course for MOS 93C (Air Traffic Controller) is being conducted with 21 students from eight states. The course includes a DL portion plus 2 weeks of resident training to cover tower operations and radar.

In addition to assisting with the conversion of institutional courses, ARI is applying DL technologies in the support of specific training course requirements. One such application is the development and evaluation of the Combat Lifesaver Course converted to a DL format that includes a combination of interactive television and CD-ROM. Because this course is a response to the requirement that one soldier in each infantry squad (active and ARNG) should be qualified as a combat lifesaver, it promises major economies in travel and per diem costs. ARI is also supporting an assessment of the practicality of using the Internet for DL. The specific target of this assessment is an aviation weather module for the 93P MOS (Aviation Operations Specialist). Although data collection related to TRADOC applications is on-going, preliminary results show that DL techniques produce achievement levels comparable to those found for institutional training.

Conclusions

As part of the Army's major commitment to DL, the ARNG has taken the lead in establishing a network of DL sites at which soldiers can receive the desired training. ARI is supporting TRADOC and the ARNG by developing the content of courses to be delivered. As the courses are conducted, ARI is evaluating their cost and effectiveness and identifying lessons learned that will enable a smooth transition to wider DL implementation.

Product References

Human Resources Research Organization (1996). *Inventory of Distance Learning Courseware*. Alexandria, VA: Author.

Ramsberger, P. F., Knerr, C. M., McKinney, D. D., Sticha, P. J., Kronholm, E. A. & Gividen, R. (MAJ) (1996). *Strategic Plan for the Academic Component of the Army National Guard Distance Learning Demonstration* (HumRRO FR-WATSD-96-23). Alexandria, VA: Human Resources Research Organization.

Related Reference

U.S. Army Training and Doctrine Command (1996). *Total Army DL Plan.* Fort Monroe, VA: Author.

SECTION 3: Other Training

The ARI research covered in this section summarizes the findings/products developed to assist the RC in the training of aviators, infantrymen, and reservists in the IRR. Because of the variety of topics discussed, and because the use of TADSS or any sort of remote delivery technology is not involved, product summaries are grouped into an "other" category.

Aviation

In response to a perceived need to standardize the content and quality of AC/RC aviation training, the Standards in Training Commission (STRAC) published a training circular in 1985 that established training standards and specified the amounts of ammunition needed to meet these standards. ARI was asked to evaluate if enough resources (time and ammunition) were indeed being set aside under STRAC to meet aviation training requirements. The results of this evaluation are discussed below.

What Was Done

Time requirements. To examine if additional time was needed to meet ARNG rotary- and fixed-wing training requirements (Szabo, Ruffner, Cross, & Sanders, 1986), ARI surveyed ARNG aviators in the following areas: (a) demographics, (b) adequacy of Continuation Training Requirements and Additional Military Requirements for maintaining a safe level of aviator proficiency, (c) willingness to spend additional time to meet these requirements, (d) obstacles to meeting these requirements, and (e) career intentions. A total of 4,800 ARNG aviators were sent mail-out surveys, 3640 of which were returned (Szabo et al., 1989).

Ammunition Requirements. These surveys were designed to develop a database containing information in three areas: (a) use of ammunition in aviation gunnery training compared with the amount required to maintain readiness; (b) availability, type, and utility of gunnery ranges; and (c) use of flight simulators for aerial weapons training. Two mail-out surveys were developed. One was addressed to aviators and the other was addressed to unit commanders. The numbers of questionnaires distributed and returned are shown in Table 2-21 (McAnulty, Cross, & DeRoush, 1989).

Table 2-21. Ammunition Surveys Distributed and Returned.

	Aviators		*Commanders*	
Component	*Distributed*	*Returned*	*Distributed*	*Returned*
Active	1190	551 (46%)	202	81 (40%)
Reserve	806	259 (32%)	160	46 (29%)
Total	1996	810 (41%)	362	127 (35%)

What Was Found

Time Requirements. Results showed that ARNG aviators judged most Continuation Training Requirements to be marginally adequate for maintaining a safe level of proficiency, and the time allotted for meeting these requirements to be barely adequate (Szabo et al., 1986). The relation between adequacy of requirement ratings and adequacy of training time ratings is shown in Figure 2-16 for tasks covered under Continuation Training. Time was judged to be particularly inadequate, for example, for the conduct of night vision goggle training, unaided night tactical flight training, and tactical/special requirements training. For Additional Military Requirements (e.g., pre-post flight tasks, nonflying aviation evaluation, preparation for inspections, in-flight evaluation/training, and military education), aviators judged the training time to be marginally adequate for all requirements except inflight evaluation/training.

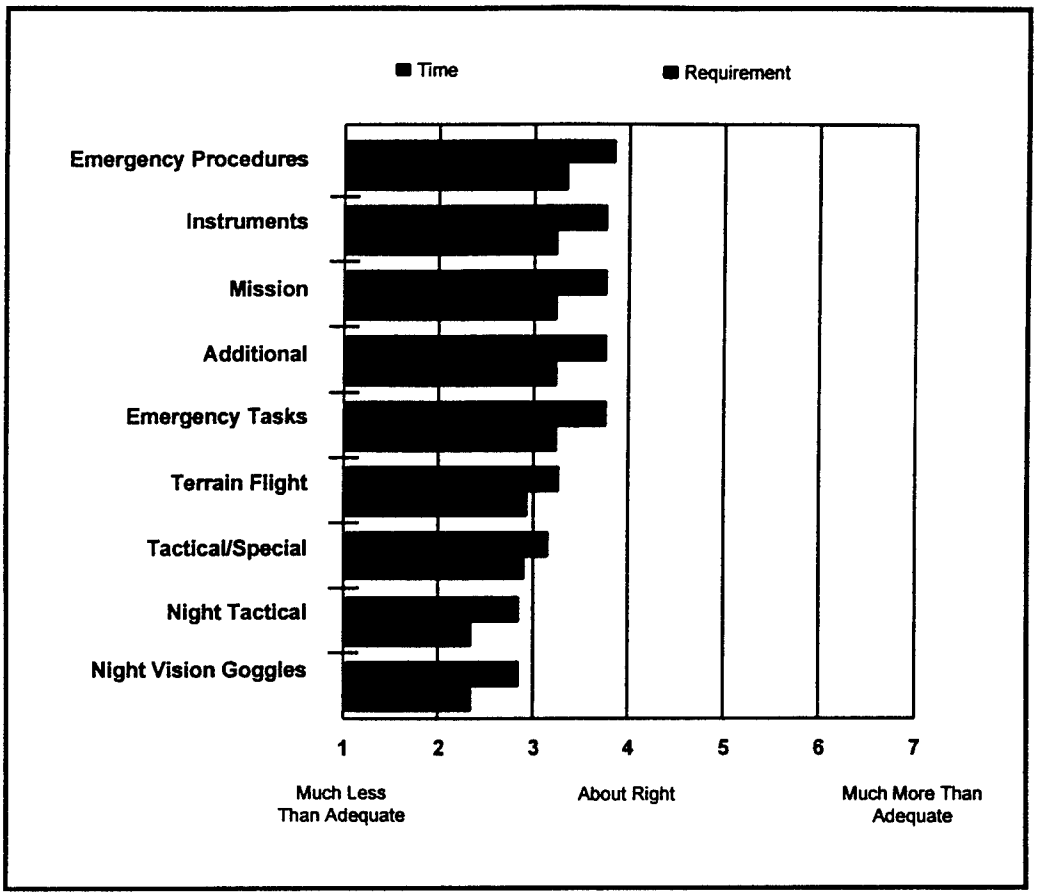

Figure 2-16. Mean Ratings of the Adequacy of Training Requirements and Time: Continuation Training Requirements.

As shown in Figure 2-17, ARNG aviators were willing to spend more paid time training to meet both Continuation Training and Additional Military Requirements, but unwilling to spend more unpaid time doing so. In addition, they identified five obstacles to achieving training requirements: (a) unavailability of support equipment, (b) lack of training support areas, (c) unavailability of instructor pilots, (d) insufficient flight hours, and (e) insufficient personal time. Responses to career intention questions showed that about 25% of the aviators would reach 20-year retirement eligibility within 5 years, but most (70%) intended to stay longer because of the opportunity afforded them to fly.

Ammunition Requirements. The responses related to the amount of ammunition required to maintain readiness showed that both AC and ARNG aviators fired fewer than the authorized amount of ammunition and that few (23% of the AC and 5% of the ARNG) met STRAC standards. The reasons cited for not achieving these standards are summarized in Table 2-22 (McAnulty et al., 1989).

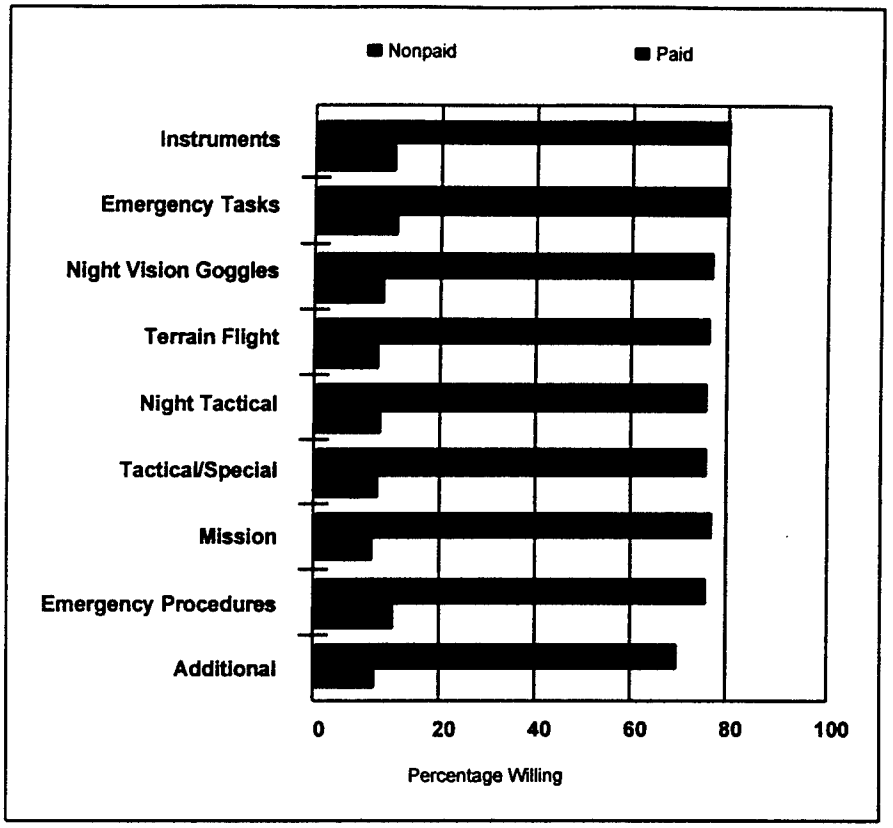

Figure 2-17. Percentage of Aviators Willing to Spend Additional Paid vs Unpaid Time to Meet Training Requirements.

Table 2-22. Reasons Cited By Unit Commanders for not Achieving STRAC Standards.		
Reason	***% AC (n = 29)***	***% ARNG (n = 24)***
Lack of Ammunition	83	63
Lack of Available Ranges	48	33
Inadequate Armament Maintenance	35	38
Range not Suitable	35	38
Wrong Type of Ammunition	45	8
Too Many Aviators to Train	7	29

Note. The total adds to more than 100% because respondents could cite all applicable reasons.

Assessment of the impact of simulator (the AH-64 Combat Mission Simulator and the AH-1 Flight Weapons Simulator) use in the ARNG revealed that this use was so rare that assessment of simulator effectiveness would be meaningless. No ARNG unit had a simulator location at their installation and the median distance to the closest simulator was 240 miles.

Conclusions

The results indicate (a) a perceived need for more training time to ensure required levels of flight proficiency, (b) the desire for retirement-eligible aviators to remain in the ARNG, (c) a need for additional ammunition allocations, and (d) the value of maintaining a database of information on training resources.

Product References

Szabo, S. M., Ruffner, J. W., Cross, K. D., & Sanders, M. G. (1986). *An Evaluation of the Training Requirements of Army National Guard Aviators Phase I: Analysis of Questionnaire Data* (ARI Technical Report 730). Fort Rucker, AL: U.S. Army Research Institute for the Behavioral and Social Sciences.

McAnulty, D. M., Cross, K. D., & DeRoush, D. J. (1989). *Army Aviation Ammunition and Gunnery Survey Volume II: Final Report* (ARI Research Report 1492). Fort Rucker, AL: U.S. Army Research Institute for the Behavioral and Social Sciences.

McAnulty, D. M. & DeRoush, D. J. (1988). *Army Aviation Ammunition and Gunnery Survey Volume I: Executive Summary* (ARI Research Report 1492). Fort Rucker, AL: U.S. Army Research Institute for the Behavioral and Social Sciences.

Lanes Training

As a result of the Army Chief of Staff's contention that RC units were tending to focus at too high a level of training (e.g., company, battalion) without establishing a strong foundation of individual and lower-echelon skills (Jones, 1992), an initiative called BOLD SHIFT was instituted. As a result of this initiative, the focus of unit collective tactical training in roundout/roundup RC brigades shifted to the platoon level in 1992. Units were to gain crew or squad proficiency before advancing to platoon-level situational training exercise (STX) lane training.

During AT, BOLD SHIFT called for the provision of training support from assets other than the unit. These assets consisted of (a) trained and validated AC officers and NCOs to act as O/Cs, (b) a fully set-up and manned training venue, (c) a full-strength OPFOR from the AC, (d) a

pre-packaged training scenario based on the unit's METL, and (e) a CPX training package for the battalion staff (Cook, 1991). Individual lanes were to be structured so that units performed a mission (e.g., Assault) that required a small number of collective tasks (e.g., React to Contact). Squads or platoons were then to rotate through these lanes where dedicated terrain was provided for each mission.

ARI monitored lanes-based training to identify lessons learned by those who provided the support as well as those who received the training. The information was to be used to help model an RC organization specifically tailored to support the lanes-training concept during AT.

What Was Done

On the basis of interviews, briefings, reports, training plans, and direct observation, ARI described the lane-based training and support provided infantry rifle squads and platoons at three sites (Forts Drum, Dix, and McCoy). The surveys and interviews were used to determine what worked and what did not. As shown in Table 2-23 (Ashworth, Phelps, Graham, & Wisher, 1992), the sites varied substantially in terms of the scope of planned training and the resources used to support training. Although the lanes concept called for the AC to provide OPFOR and O/Cs, one site drew those assets from the RC. In addition, only one site included a staff CPX.

Table 2-23. Variations Among Sites.

Site	*Planning & Support*	*Number of Units*	*Number of Missions*	*Number of Tasks*	*Source of OPFOR*	*Battle Staff Trng*
Ft. Drum	AC Only	13 Squads	2	11	Integral Unit	Order Writing
Ft. Dix	Mostly AC	6 Platoons, 18 Squads	1	10	Integral Unit	None
Ft. McCoy	Mostly RC	9 Platoons, 21 Squads	4	20	Integral & Composite	2 Day CPX

What Was Found

Lanes-based training at the squad and platoon levels was found to be very successful. Despite the variety of approaches, participants and trainers at each site described the training as "the best ever" (Ashworth et al., 1992). Trainers, platoon leaders, and squad leaders agreed that training at each site was realistic, performance standards were strictly enforced, sufficient training time was provided, AARs were timely, and soldier enthusiasm and motivation were high. The only consistently noted shortcomings were inadequate battle staff training (at one site there was none) and low involvement of company commanders. Both problems could be attributed to the shift in training emphasis to lower levels.

Conclusions

The results underscore the success of squad- and platoon-level training under a lanes-based concept. The associated account of what aspects of this training worked and what aspects did not, as well as the magnitude of support required for each event, will facilitate future planning should the concept of lanes-based training be continued.

Product References

Ashworth, R. L., MAJ, Phelps, R. H., Graham, S. E., & Wisher, R. A. (1992). *LANES 92: Training, Support and Resources, or . . . What Worked, What Didn't Work and What It Cost You.* Briefing for CG, First U.S. Army. Boise, ID: U.S. Army Research Institute for the Behavioral and Social Sciences.

Related References

Cook, LTC. (1991). *Information Paper: Regional Training Concept* (NGO-ARO-M). Arlington, VA: National Guard Bureau.

Jones, J., MAJ. (1992). Reserve Component Enhancement Training. *Armor*, January-February, 1992, 40-43.

IRR Training

Individuals who join the Army incur an 8-year initial service obligation. Most are placed on active duty at the beginning of this period to be trained in an MOS or Specialty Code. Upon completion of this training, these individuals may remain on active duty or complete their service obligation through participation in the ARNG, USAR Troop Program Units, or the IRR.

Reservists in the IRR are required to maintain contact with their career managers and accumulate points toward fulfilling their military obligation or toward retirement by participating in training programs at the convenience of the reservists and the Army. As a result of these training programs, Army personnel managers are able to maintain significant numbers of "civilian soldiers" who are qualified in critical MOSs and Specialty Codes and may be activated during mobilization. About 20,000 IRR members were activated, for instance, during the Persian Gulf War (Wisher, Sabol, Maisano, Knott, Curnow, & Ellis, 1996).

Because IRR soldiers do not maintain contact with the military, except for participation in the training programs mentioned above, the question of how to best conduct these programs is

of continual concern. To help answer this question, ARI has conducted research with IRR rotary-wing aviators and field medics. The results of this research are discussed below.

What Was Done.

Rotary-Wing Aviators. In 1979, about 6,000 IRR officers were formerly qualified as Army rotary-wing aviators, but the retraining programs lacked standardization and were considered resource intensive. To help solve this problem, ARI developed a self-paced, 2-year retraining program that included both hands-on flight and paper-based academic training. This program resulted in improved training effectiveness and efficiency (Allnutt & Everhart, 1980), but follow-up surveys distributed after its initial tryout revealed that too much time and instructor pilot (IP) attention was being devoted to the academic portion of the training program. As a result, ARI revised their program to reduce on-site academic training through voluntary home-study or self-study at the training site, and then evaluated this revised program.

ARI worked with experienced IPs to develop the self-paced materials (study guides, quizzes, and a diagnostic examination) to define academic knowledge requirements and to organize these requirements into instructional units (Wick, Millard, & Cross, 1986). Flight training was conducted through the self-paced proficiency progression program developed previously.

Forty-seven IRR aviators participated in the evaluation. Twenty-four were able to complete some of the self-paced academic instructional units prior to arriving for on-site training. Those who did not complete self-study before their arrival did so along with interspersed flight training upon their arrival.

What Was Found

The knowledge level achieved through self-study of the academic materials was assessed through performance on a post-training paper-and-pencil examination and an oral examination administered by the IPs. Only one aviator was unable to achieve the 90% criterion score on one academic paper-and-pencil tested unit. On the oral examination, 89% of the aviators passed on their first attempt; the remainder passed on the second attempt. In follow-up questionnaires, 80% of the aviators judged that the self-study approach was as good or better than a traditional lecture approach (Wick et al., 1986).

Flight proficiency was assessed through IP ratings on psychomotor tasks (e.g., a 7-point scale on steep approach) and omissions of steps in procedural tasks (e.g., radio communication). All aviators successfully completed the hands-on flight training portion of the program, further confirming the effectiveness of the self-paced academic training portion. The number of flight hours required to pass the checkride ranged from 10 to 26, with a mean of about 17.

A standard multiple regression analysis was performed to determine the extent to which the number of flight hours required to complete flight training (FLTTRAINHRS) could be predicted from the total number of flight hours logged during an aviator's active duty military

career (MILFLTHRS) and the number of years since an aviator had flown on active duty (YEARSOUT). The obtained significant ($p<.001$) relation, depicted in Figure 2-18 (Wick et al., 1986), shows that 1 hr of flight time is required to offset the degrading effect of every 2 years away from active duty flying.

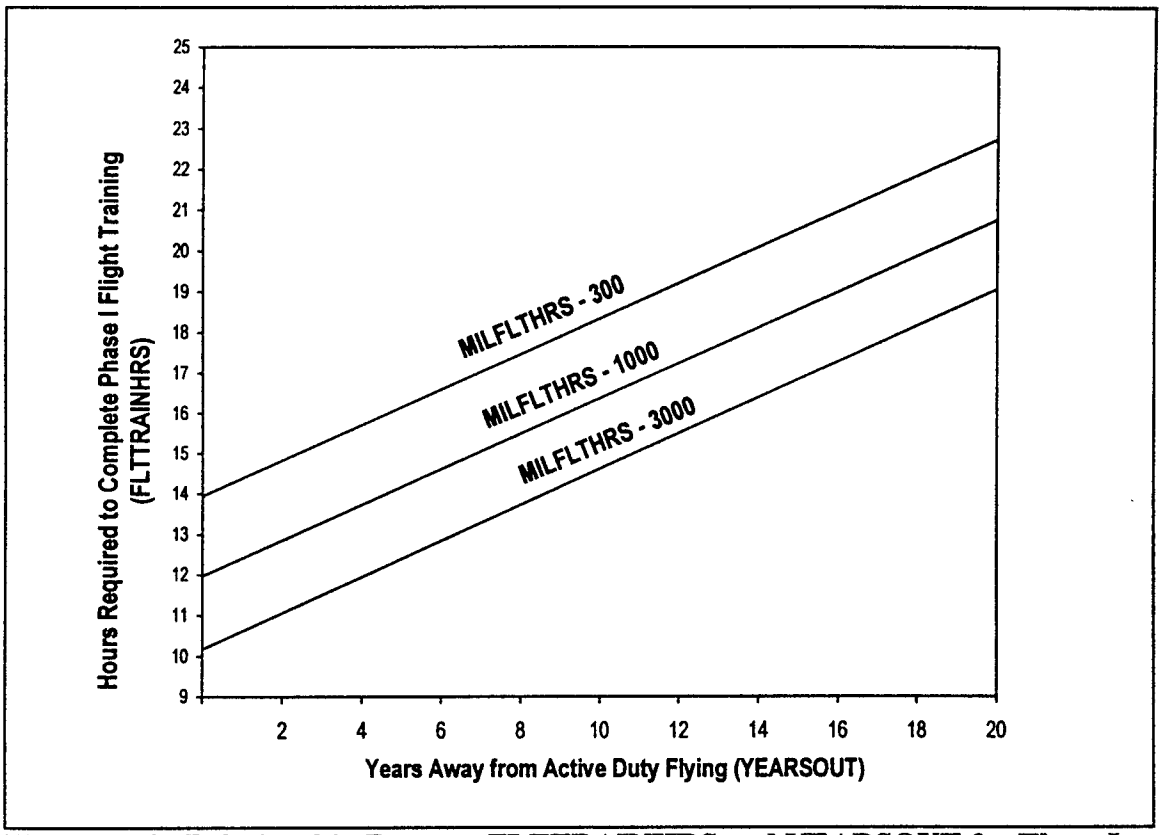

Figure 2-18. Relationship Between FLTTRAINHRS and YEARSOUT for Three Levels of MILFLTHRS.

About half of the IRR aviators were retrained one year later. Although they required less time to master the academic material and to reacquire flight skills under the revised training program, the differences were small.

This research shows that the revised IRR aviator training program can produce a proficient aviator in far less time (about 40 hr of self-study and an average of 17 hrs of flight time) than that required to do so through the initial entry rotary wing program (about 200 hr of classroom academic study and about 75 hr of flight training). In the event of mobilization, RC leaders should also consider the extent of experience while on active duty, as well as the time since separation from active duty, in selecting IRR aviators to be called up. Those having only a short separation from active duty, or those who flew in the active Army for many years, for example, should require less retraining time (and cost) to regain proficiency.

What Was Done

Field Medics. Previous work with combat engineers (Kern, Wisher, Sabol, & Farr, 1995) found that IRR soldiers' measures of retention and relearning of MOS skills were strongly related to length of prior active duty service and to general aptitude, as measured by the Armed Forces Qualification Test (AFQT), but not to the length of time separated from active duty (unlike the results for aviators reported above). ARI extended this analysis to field medics and added examination of IRR soldiers' civilian occupation as a possible predictor of training success.

ARI monitored training of 114 IRR field medics who volunteered to participate in a mobilization exercise. For analysis purposes, the medics were categorized as Partial-Tour Soldiers (fewer than 19 months of active duty) and Full-Tour Soldiers (19 months or more of active duty). Full-Tour Soldiers had a greater proportion of both moderately high-aptitude individuals and low aptitude individuals and were more likely to have medical-related civilian occupations (Wisher et al., 1996).

All of the field medics took a job knowledge test and a series of hands-on diagnostic tests prior to the start of training. During this training, instructors delivered lectures that included a practical demonstration. After a lecture, groups were broken down into subgroups that were given additional demonstrations and individual hands-on testing. After training, each medic took an alternate form of the job knowledge test and repeated the hands-on tests.

What Was Found.

Training was found to improve both job knowledge and hands-on performance. Job knowledge scores improved 11% for Full-Tour Soldiers and 8% for Partial-Tour Soldiers. Hands-on performance improved from a 36% GO rate before training to a 92% GO rate after training. While initial training to become a field medic takes about 58 hr, retraining for the IRR medics took only about 22 hr.

Predictors of retention and reacquisition were examined using multiple regression analyses summarized in Table 2-24 (Wisher et al., 1996). Separation time had only a negligible effect on retention, with most forgetting found to be related to general aptitude and the correspondence of civilian job content to field medic tasks. Similarly, reacquisition was also attributed to general aptitude and the civilian/medic task relation.

Table 2-24. Significant Predictors in Multiple Regression Analyses.					
Full Tour Soldiers: Predicted Measure					
Knowledge Pretest (mean=74%)		Knowledge Posttest (mean=82%)		Hands-on Pretest (mean=42%)	
Aptitude	p<.001	Aptitude	p<.01	No significant predictors	
Civilian Job	p<.01				
Active Duty	p<.05				
Partial Tour Soldiers: Predicted Measure					
Knowledge Pretest (mean=67%)		Knowledge Posttest (mean=78%)		Hands-on Pretest (mean=30%)	
Aptitude	p<.005			Aptitude	p<.025
Civilian Job	p<.001	Civilian Job	p<.01	Civilian Job	p<.0001

The relation between civilian job and length of service is illustrated in Figures 2-18 and 2-19 (Wisher et al., 1996) for three groups of tasks: routine recording of a patient's vital signs (e.g., blood pressure), emergency tasks (e.g., applying a tourniquet), and delayable tasks to treat a stabilized patient (e.g., set up an IV). The dashes represent the difference between 100% performance and that which might be assumed for an active duty field medic. In both cases, civilian medics showed higher skills than the most recently separated IRR soldiers. Also, it did not seem to matter much how long IRR soldiers were required to retain their skills (i.e., length of active duty separation).

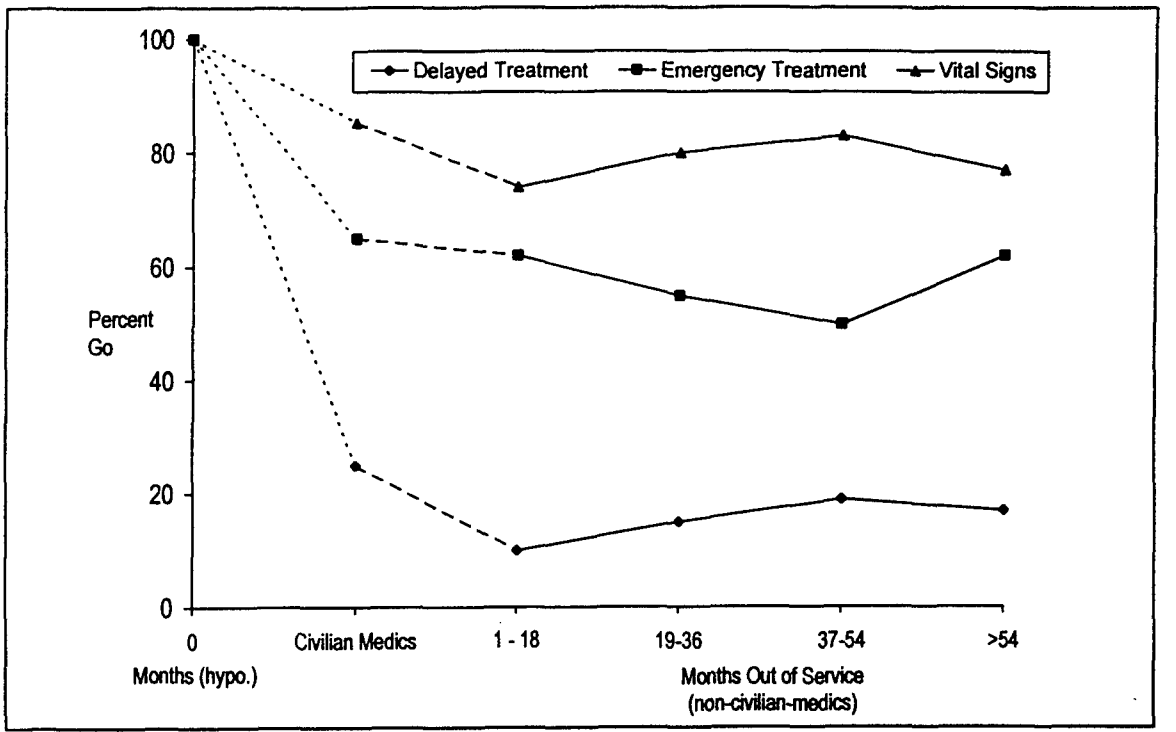

Figure 2-19. Three Categories of Hands-on Tasks as a Function of Active Duty Separation Interval for Full-Tour Soldiers.

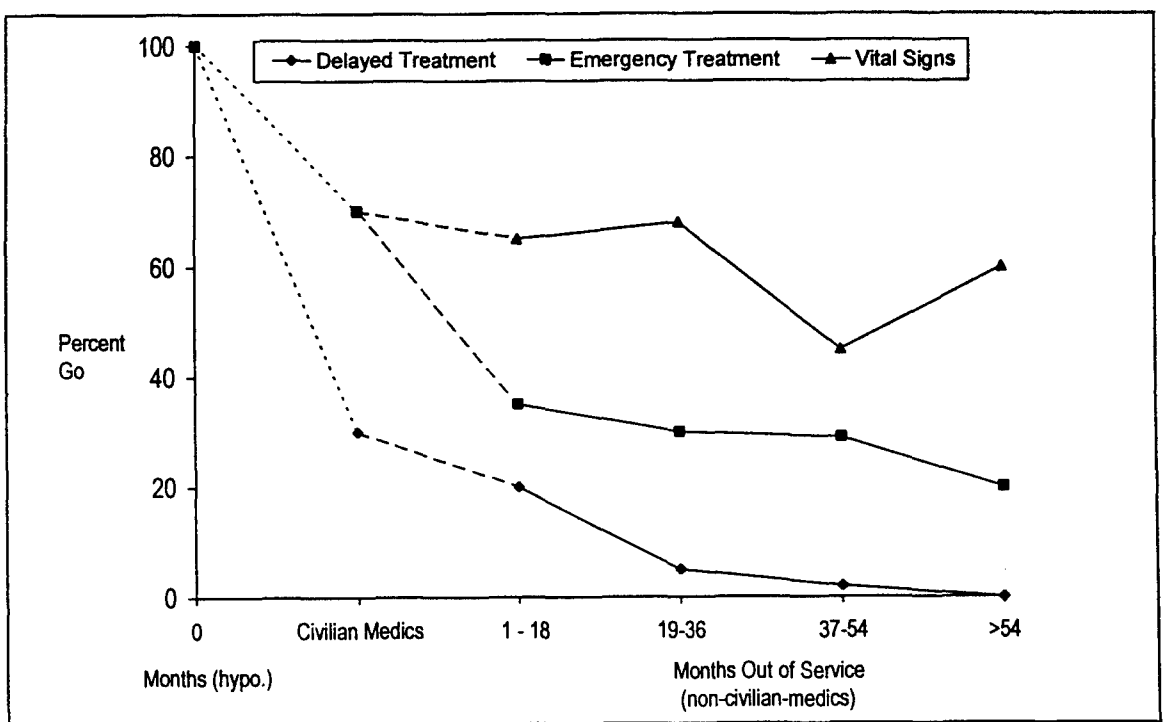

Figure 2-20. Three Categories of Hands-on Tasks as a Function of Active Duty Separation Interval for Partial-Tour Soldiers.

The findings of work with IRR field medics, like those found with IRR aviators, support the notion of extending the separation interval for the IRR during a mobilization well beyond the 12-month period used during ODS. It would also be effective to concentrate on mobilizing high aptitude soldiers with full active duty tour experience, with priority given to soldiers who have been employed in occupations similar to their MOS (Wisher et al., 1996).

Conclusions. Both efforts described above demonstrate the cost-effectiveness of rapid train-up for the IRR. The work with aviators demonstrates that the knowledge component of IRR training can be conducted effectively and efficiently, at least for officers, under a self-study mode. In regard to mobilization priorities, both efforts demonstrate that the depth of active duty experience is at least as important as the length of separation. In addition, factors such as civilian job similarity may improve the effectiveness of selecting IRR members to be activated.

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CHAPTER 3: Manpower and Personnel Product Summaries

As evidenced in Chapter 2, most previous ARI research in support of the RC has focused on training-related issues. A notable exception to this is the comprehensive assessment of a broad range of manpower and personnel issues associated with the first significant deployment of a composite AC/RC force for a 6-month rotational peacekeeping mission in the Sinai Peninsula. The Army Chief of Staff requested this assessment which was carried out jointly by ARI and researchers at the University of Maryland. The research involved assessment of five areas: (1) personnel, (2) training, (3) attitudes and perceptions, (4) family support, and (5) home-unit impact. It is documented in a number of technical reports and in a comprehensive book recently published by ARI, *Reserve Component Soldiers as Peacekeepers* (Phelps & Farr, 1996). This research is not only striking in its breadth, but also in the rare opportunity it provided for a diverse group of ARI researchers across headquarters and field unit offices to work together toward a common research goal. It also provided the opportunity for a wider range of ARI researchers to become more familiar with the RC and the issues that differentiate it from the AC.

Operation Desert Storm (ODS), which occurred during a turbulent economic period for the U.S., provided a number of unique opportunities to study the effects that mobilization has on RC members and their families. One such study involved the Surveys of Total Army Military Personnel (STAMP). As part of this study, Initial STAMP (i.e., the 1991 Survey of Mobilized Reservists) was targeted toward the RC in an effort to obtain feedback about the problems that reservists had during the ODS deployment. In general, information was obtained about how the deployment affected the RC members' lives (e.g., impacts on their civilian employment and income). Information was also obtained about the reservists' perceptions of Army leadership during ODS. Because of the IRR call-up during ODS, information was also gathered concerning the problems that IRR members experienced during mobilization. The information obtained was particularly valuable in the deeper level of understanding it provided concerning the various conflicts experienced by RC members as a function of their various commitments (e.g., military duty, family, and civilian employment).

Given the various roles for which RC members are responsible, it is not surprising that many members become dissatisfied with their reserve commitments and eventually change their minds about becoming career reservists. Today's Army is working to meet its RC personnel requirements based on insight about enlistment and retention motivations provided by ARI research. For example, research that examined attrition after NTC, Reforger, and Blazing Trails exercises revealed that increased training time resulted not only in increased readiness, but also in increased attrition. These findings are important in that they help the Army gain an awareness of the conflicts created by any additional training time that may be needed for RC members to achieve training standards. Other ARI research has provided valuable information about the characteristics of soldiers who attrit from the RC and determinants important for ensuring job satisfaction among RC members.

Because of its intermittent training schedule, it is particularly difficult for the ARNG to determine the levels of resources required to maintain unit readiness. Recently ARI completed a study that assessed the impact of differing levels of resources on selected ARNG units' ability to accomplish specific tasks, missions, and objectives. This research was important in highlighting the need for appropriate levels of full-time support personnel and training assemblies for RC units to be motivated and to perform to their potential.

The research that ARI has conducted concerning the RC's manpower and personnel issues has provided important findings for Army planners and policy makers. Indeed, many of the recommendations highlighted from this research have been implemented, or have led to additional research. The sections in this chapter detail ARI's research related to RC manpower and personnel issues.

Multinational Force and Observers (MFO) Research Program

Faced with an increasing need for troop support in world-wide peacekeeping missions at a time when reductions in force strength are taking place, the Army is exploring ways in which RC soldiers can be used to fulfill some of its peacekeeping commitments. One peacekeeping mission in which the U.S. has been involved is the MFO in the Sinai. The Sinai mission is to observe and report violations to the Egyptian-Israeli Treaty of Peace (1979) resulting from the Camp David Accords (1978).

In fulfillment of its MFO responsibilities, the U.S. has deployed, since 1982, an infantry battalion for 6-month rotations. The U.S. is responsible for observing the area of operation in the southern third of the Sinai, bordering the strategic Gulf of Aqaba and the Strait of Tiran. U.S. soldiers typically spend 3 weeks at a remote observation/control site, 3 weeks at base camp, and then rotate back to the same remote site.

In response to a request from the Army Chief of Staff, the Army examined the feasibility of recruiting qualified RC volunteers and deploying a battalion sized unit composed of AC and RC soldiers for the 6-month rotational assignment in the Sinai. The test battalion, known as the 4-505 Parachute Infantry Regiment (PIR) of the 82nd Airborne Division, was formally activated in November 1994 and inactivated in July 1995. As depicted in Figure 3-1, the PIR was composed of 80% RC and 20% AC soldiers, with the officer and NCO positions filled equally by RC and AC soldiers. Almost all junior enlisted positions, however, were filled from the RC.

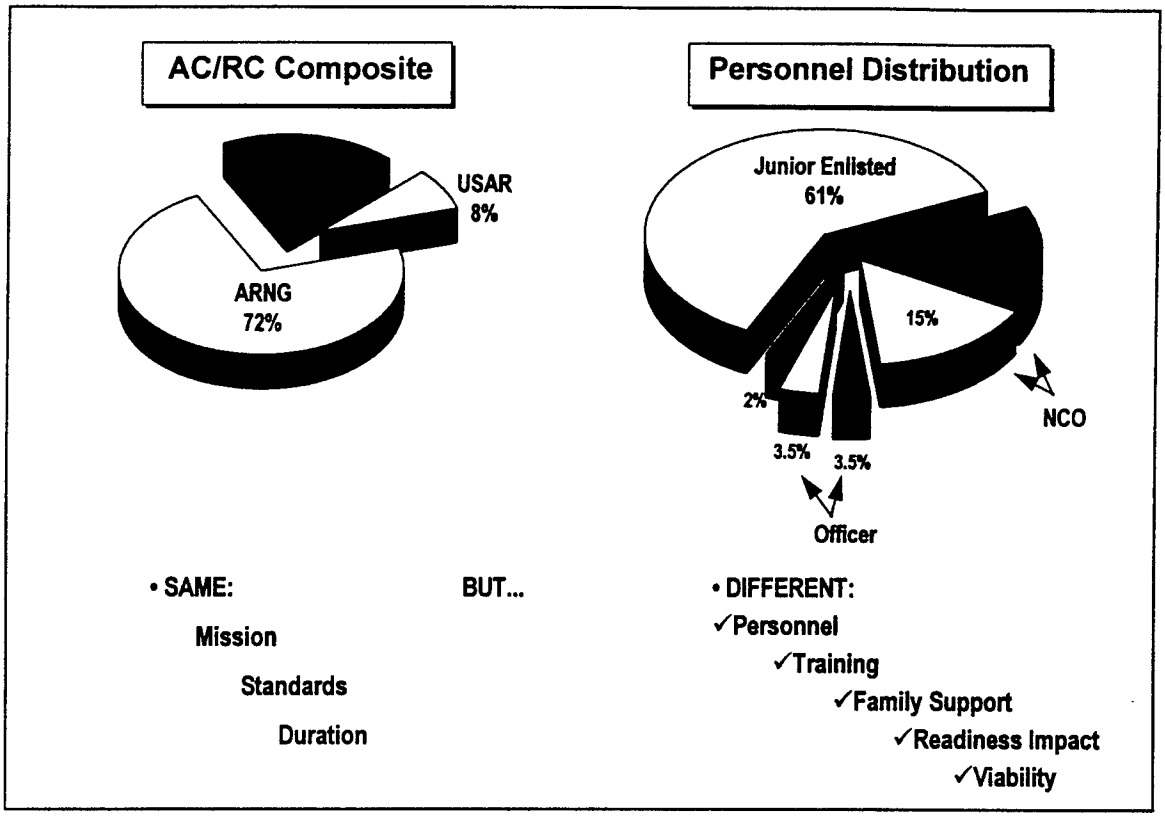

Figure 3-1. Composition of the Sinai MFO Test Battalion.

What Was Done

ARI examined the process used to recruit and screen RC soldiers, their predeployment training, unit cohesiveness, soldier morale, and the effectiveness of family support services provided RC soldiers. A longitudinal case study was conducted in which soldiers were tracked during their Sinai rotation. Survey instruments and interview protocols were developed and administered to soldiers, leaders, trainers, and spouses throughout the predeployment and deployment phases at Ft. Bragg, Ft. Benning, and/or in the Sinai. ARI visited the test unit and collected data from its soldiers three times during predeployment and twice during Sinai deployment. The five areas addressed in the surveys and interviews included:

- ***Personnel***, which covered the recruiting and screening process, their demographics, their reasons for volunteering, and their expectations for the peacekeeping experience.

- ***Training***, which covered the types of tasks trained, the length and sequence of training, and soldiers' job knowledge following training.

- ***Attitudes and Perceptions***, which covered unit cohesion, morale, and impact of the deployment on soldiers' civilian and military lives.

- ***Family Support***, which covered the adequacy of the RC family support system and how serving in the Sinai affected the quality of soldiers' marriages.

- ***Home Unit Impact***, which covered personnel, training, and readiness changes that occurred in the sponsoring 29th Infantry Division (Light) (29th ID[L]) as a result of losing soldiers to the MFO mission.

Results obtained from the AC/RC composite battalion in the areas of training, unit cohesion, and morale were also compared to those obtained from prior all-AC battalions deployed to the Sinai.

What Was Found

Personnel. Efforts were successful in recruiting the required 446 RC soldiers to participate in the MFO. The ARNG volunteer screening process was primarily administrative (i.e., records were reviewed) and took place at the brigade, battalion, and division levels. In contrast, the USAR screening process was primarily a supplemental process in which decisions were based on the soldiers' performance during their training at Ft. McCoy.

Slightly more than half of the soldiers recruited came from the Maryland and Virginia ARNG (29th ID[L]). The remaining soldiers were recruited from 33 other states. Of the soldiers who participated in the MFO, almost half were employed full time, about a quarter were employed part time or were in school, and about a fifth were unemployed. Slightly less than one-third (28%) of the RC soldiers were married as compared to a little more than half (56%) of the AC soldiers. Almost all RC soldiers were male and possessed at least a high school education. No differences existed between RC and AC soldiers in age, education, and spouse employment. Soldiers in the two components did differ, however, in their overseas tour experience (most AC soldiers had served overseas before, whereas most RC soldiers had not) and direct combat experience (only 15% of RC soldiers had direct combat experience, whereas almost half of AC soldiers had such experience).

The majority of RC soldiers said they volunteered for a challenging and adventurous way to serve their country and/or to enhance their military careers. The need for more money and various benefits were rated as moderately important reasons for volunteering, with time out from school/job, family problems, and unemployment rated lowest in importance. Approximately four-fifths of RC soldiers indicated they wanted to take educational courses while deployed in the Sinai and almost all RC soldiers planned to travel for recreation.

Although recruiting efforts were eventually successful in acquiring RC soldiers who met the physical and performance standards set by the Army, a lack of continuous communication with volunteers led to additional efforts to recruit the required number of RC soldiers (3 weeks prior to reporting to Ft. Bragg, it was discovered that 39% of volunteers would not be able to participate in the MFO). The major reasons given for not reporting included family (41%), job

(14%), and school (14%). Further, the Army Reserve Personnel Center (ARPERCEN) reported making about 150 calls per volunteer to recruit the USAR's required 45 MFO slots. Of the 39 volunteers identified to attend refresher training at Ft. McCoy, only 10 soldiers actually joined the peacekeeping unit; the USAR made up the shortfall from the original target of 45 soldiers by recruiting from its troop program units. A hard lesson learned from this experience was that, because citizen soldiers must consider the needs of others (e.g., spouse, family, employer), there is a high likelihood that a soldier who volunteers several months prior to a mission may not be available at the reporting date.

A number of personnel issues were highlighted as a result of this experience. First, a great deal of effort was expended (particularly to recruit USAR volunteers) not only to identify RC volunteers, but also to make up shortfalls for "no shows" and for volunteers who were not qualified for the mission. Second, the process used to screen RC volunteers was not standard, making it difficult to interpret and apply specified qualifications set for the test unit. Third, a lack of timeliness and completeness of information hindered the recruiting process. Finally, a lack of follow-up communication and feedback hindered the retention of initially recruited volunteers.

Training. It is reasonable to expect that specialized training for peace operations has different requirements for knowledge, skill, attitude, and environmental considerations than those requirements for training warfighting operations. It is also reasonable to expect that soldiers should be sensitized to the local conditions, cultures, and laws before being deployed on a peacekeeping mission. To study the effectiveness of training for the MFO mission, the tasks on which RC soldiers were trained and their later performance of these tasks were tracked. Special tests were developed and administered just before the battalion was deployed to measure the soldiers' knowledge of common soldiering tasks and MFO peacekeeping-specific tasks. Evaluations were also collected from soldiers and trainers during predeployment and overseas deployment.

Overall, the composite unit was found to be as prepared to accomplish the MFO mission as was a prior all-AC comparison unit. Further, the 3 months of training received by the test battalion during predeployment was judged to be comparable to the training received by a (then) recent all-AC battalion before it was deployed to the Sinai. More specifically, the composite unit's predeployment training was considered to be as extensive as that of the AC unit; the mission-related MFO training was judged to be more than adequate for the operation by both units; and the level of knowledge required to perform MFO and soldiering tasks remained comparable to that of the AC unit throughout the rotation. However, because there was no previously established unit cohesion, two additional months of training were required for the test battalion's leaders in garrison and at the Infantry Leaders Course (ILC).

A content analysis of the predeployment training evaluations indicated several recommendations. First, a decrease was suggested in the time allotted to the ILC or that the ILC be replaced by training that focused on peacekeeping rather than infantry tasks. Second, in

response to MFO leadership not receiving sufficient early training in the predeployment phase, provide MFO leadership with a "big picture" overview of the peacekeeping mission. Finally, eliminate the IRR training because it had minimal payoff (i.e., only 28% of attendees joined the MFO unit) and was redundant with the training soldiers received at Ft. Bragg.

Perceptions and Attitudes. Although test battalion soldiers had not previously served together, their unit cohesion approximated that of a prior all-AC rotation. An analysis of survey and interview data indicated that the RC soldiers worked as well, or better, with AC leaders as they did with ARNG leaders. Also, it appears that squad member cohesion and job performance were not affected by assigning temporary soldiers from different components or from different states to work together.

Although unit cohesion was initially perceived to be high, a decrease in soldier morale over time was noted. In general, soldiers who reported volunteering for patriotic reasons tended to indicate higher mission motivation, morale, and squad cohesion than did soldiers who reported volunteering for monetary reasons. Also, officers tended to be more positive than enlisted soldiers, and the RC volunteers tended to have more positive attitudes than the AC soldiers. The good news is that the decrease in soldier morale did not negatively influence performance; the bad news is that it may have changed the soldiers' perceptions and attitudes towards participating in similar future missions and their retention in the military. Specifically, a significant increase over the predeployment and deployment period was noted in the number of RC soldiers indicating they would not volunteer for future missions (36%) or would not remain in the military (26%). It appears this increase resulted from discrepancies in soldier expectations formed during the recruitment process and what they experienced on duty (e.g., educational opportunities were fewer, costs were higher).

Family Support. Although about one-third of the test battalion's soldiers were married, their families were located in 26 different states, of which about half lived more than 50 miles from the nearest AC military installation. To ensure support was provided when needed, a system was put into place whereby ARNG family coordinators were notified of families in their states and then provided with special MFO information intended to assist these families. Further, the battalion commander assigned an ARNG family support NCO to the rear detachment as a full-time family assistance officer. Although late in the deployment, a telephone line was also established to help soldiers maintain contact with their families. Finally, the Family Assistance Officer (FAO), the *Family Support Handbook*, and the battalion newsletter were important contributions to the family support system.

Responses to surveys and interviews indicated that family and non-Army friends provided the soldiers' spouses with support and helped them to solve the problems they encountered. However, spouses who did use the Army's family support system indicated satisfaction with the support provided.

In regard to marital satisfaction, quality, and stability, soldiers and their spouses reported small decreases in marital stability and satisfaction, with an increase in marital quality. Interestingly, it was the soldiers who complained of a lack of spousal support and the feeling that the family was interfering with their work. Overall findings seem to indicate that the complaints were related to lowered spouse support for the mission, reduced willingness by the couple to be an Army team, lowered soldier morale, and greater interference of the marriage with actual soldier job performance. A key finding here is that, because it was the soldiers rather than the spouses who complained of the family interfering with their work and a lack of support, future "fixes" should include advice and support to deployed soldiers as a way to increase soldier performance and morale.

Home-Unit Impact. The 29th ID (L) was responsible for the RC portion of the peacekeeping mission and contributed the majority (294) of the composite battalion's volunteers. To assess the impact of the mission on the 29th ID (L), 71 senior leaders from the division's nine contributing infantry battalions were surveyed twice (i.e., 60 and 170 days after unit deployment to the Sinai) and interviewed once (i.e., about 90 days after returning home), and 875 junior leaders and soldiers were surveyed once (120 days after unit deployment to the Sinai).

An initial negative impact on combat readiness and training was reported by senior leaders, with greater impacts reported by leaders who had lost more of their troops to the mission. These same leaders, however, reported a positive impact of this mission on combat readiness and training by the time the volunteers had returned to their units. Further, almost three-fourths of the leaders reported the volunteers were better trained upon returning to the units after having participated in the MFO mission.

Overall, it appears the 29th ID (L) was proud to have been chosen to sponsor the MFO. This was evidenced by (a) the division consistently reporting a positive effect on morale in terms of its participation in the MFO, (b) senior and junior leaders reporting an increase in unit morale, and (c) endorsement of future participation in similar peacekeeping missions by nearly all junior and senior leaders.

Conclusions

It appears that RC volunteers and AC soldiers can be successfully integrated into a special unit for the purpose of peacekeeping. Consideration of the following lessons learned may allow the use of RC soldiers to be a feasible option for the Army in meeting some of its current and future overseas peacekeeping responsibilities:

- ***Personnel:*** Sufficient numbers of qualified RC volunteers were recruited for the MFO; however, future efforts should be made to:
  - Maintain more frequent communication with RC soldiers who volunteer for similar types of missions to keep them abreast of their status in the selection process.

- Identify in advance, and communicate in writing, exactly what the conditions, opportunities, and benefits are for the RC soldier to volunteer for such missions.

♦ ***Training:*** RC soldiers were well trained and successfully completed their MFO mission; however, future efforts should be made to:

- Emphasize peacekeeping tasks during soldier and leader training so that predeployment training time can be shortened.
- Use peacekeeping training rather than the ICL to build cohesion.
- Use job knowledge tests and supervisor rating scales as diagnostic and competency-testing tools.
- Develop unit measures of peacekeeping performance in addition to the already existing soldier measures.
- Include command and control synchronization in the training, possibly by using simulations and simulators.

♦ ***Attitudes and Perceptions:*** Although unit cohesion was initially high, morale declined. Therefore, future efforts should be made to:

- Train leaders to recognize conditions of peacekeeping, such as boredom and isolation, that may lead to morale problems.
- Educate leaders on the possible negative morale effects caused by micromanagement.
- Increase the frequency and accuracy of information during the recruitment and training phases so that soldier expectations can be more realistic.

♦ ***Family Support:*** The family support system in place during the MFO was adequate; however, future efforts should be made to:

- Ensure family support remains a high priority throughout the mission.
- Assign family support providers as geographically close to families as possible.
- Maximize the use of existing family assistance programs.

- Ensure family addresses and telephone numbers are accurate.

- Allow each soldier one call home per month without charge to help increase morale.

- ***Impact on RC Home Unit:*** Home-unit morale increased during the MFO, and units were able to compensate for small temporary losses in personnel; however, future efforts should be made to:

  - Draw volunteers from the largest pool possible so that the number of soldiers taken from any one individual battalion is limited.

  - Take advantage of the morale benefits that result from sponsoring a mission similar to the MFO.

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STAMP: Measuring the Attitudes and Concerns of RC Soldiers in Operation Desert Storm (ODS)

The Surveys of Total Army Military Personnel (STAMP) gauged the attitudes and concerns of soldiers during and after ODS. ODS occurred during an extremely turbulent economic period for the U.S., when budget cuts were affecting both the private and public sectors and the Army was in the process of significantly downsizing its forces. This downsizing was temporarily halted during ODS, but continued upon its conclusion. STAMP was developed to measure the impact of ODS and downsizing on the retention, morale, and readiness of Army soldiers.

What Was Done

The 1991 Survey of Mobilized Reservists (i.e., Initial STAMP) was developed to obtain immediate feedback on RC soldiers' experiences during ODS. Initial STAMP targeted reservists who experienced problems during the deployment that were unique to the reservists or more prevalent than those problems encountered by the AC. Initial STAMP provided the framework for the development of the 1991 Survey of Total Army Military Personnel (i.e., Main STAMP), an instrument that measured the attitudes of over 50,000 AC and RC soldiers.

The survey contained 124 items that examined soldiers' mobilization experiences, career intentions, and perceptions of unit morale, readiness, leadership, and training during ODS. The survey was distributed to a stratified random sample of reservists. Stratification was based on military personnel classification (enlisted, commissioned officers, and warrant officers) and location of deployment (Continental U.S. [CONUS] and other than CONUS [OCONUS]). Table 3-1 shows the distribution of respondents by personnel group (for the RC) and location of deployment.

Table 3-1. Distribution of Respondents by Personnel Group and Location.

	Personnel Group			
Reserve Component	***Enlisted***	***Commissioned***	***Warrant***	***Total***
USAR	109	194	28	331
ARNG	97	71	15	183
IRR	71	12	3	86
Total	277	277	46	600
Deployed Location				
SWA	105	70	10	185
USAREUR	74	77	8	159
CONUS	53	120	22	195
Other	23	2	0	25
Not Deployed	18	9	9	36
Total	273	278	49	600

What Was Found

Mobilization Effect on Employment. Figure 3-2 presents the employment status of STAMP respondents. Almost two-thirds of the soldiers held full-time jobs prior to mobilization. The job security of mobilized soldiers appeared to be contingent upon the size of the firm; larger firms (greater than 100 employees) could support the temporary loss of one employee more than smaller firms. Unfortunately, 42% of mobilized reservists were employed by firms with less than 100 employees. Those soldiers who were self-employed were most likely to lose their jobs

(29% expected to be unemployed when deactivated) because of the unavailability of a replacement during deployment.

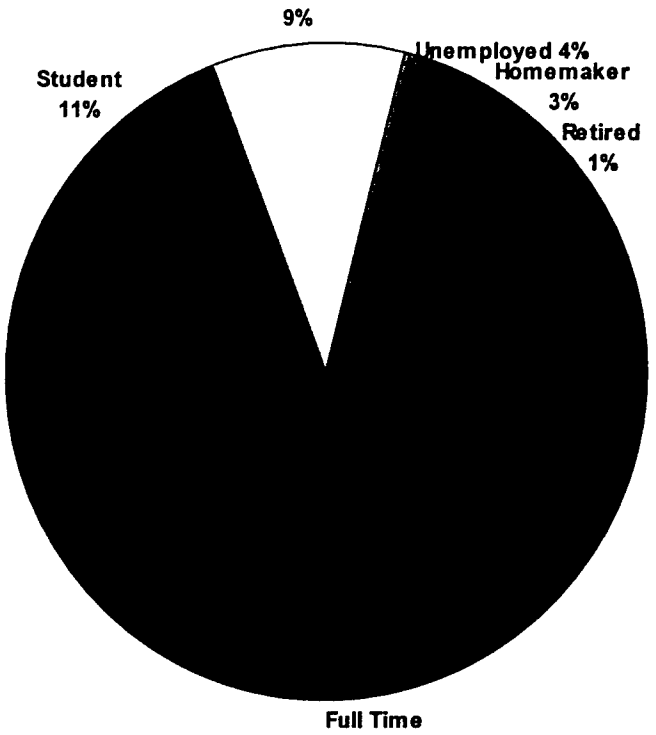

Figure 3-2: Percent of Initial STAMP Respondents in Each Employment Status.

Mobilization Effect on Income. Approximately one-half of the respondents expected to receive the same monthly income within a month of being deactivated. Self-employed individuals were again most negatively affected, as 36% of the self-employed anticipated not receiving the same income for more than 6 months. Some companies provided income and/or benefits for mobilized soldiers to alleviate the impact of mobilization. These percentages are shown in Table 3-2.

Table 3-2. Percentage of Companies Providing Income and/or Benefits to Reserve Soldiers Mobilized for ODS.

Company Size (# of employees)	*Partial Pay*	*Full Pay*	*Health Benefits*	*Other Benefits*
1-10	11	11	23	14
11-100	7	9	32	35
101-500	5	12	38	28
500+	16	34	81	77

Mobilization Effect on Academics. Eighteen percent of STAMP respondents were enrolled in a college or graduate school when deployed. Two-thirds of these students were

informed they would receive a full refund, but would not get credit for the course. This appears to be consistent with the practices of higher education, thus suggesting that activated soldiers received the same treatment as civilians who withdraw from school for various reasons.

Mobilization Effect on Personal Arrangements. The Army requests that soldiers make personal arrangements (i.e., have a family care plan and will) in the event of mobilization. It is believed that such arrangements alleviate a soldier's family concerns and will therefore increase the soldier's readiness and performance. Enlisted soldiers were less likely than officers to make personal arrangements. For example, a substantial difference existed between the percentage of soldiers and officers who had made wills (47.5% vs. 67.6%). Table 3-3 presents the percentages of enlisted soldiers and officers who made such arrangements.

Mobilization Effect on Personnel Services. STAMP asked several questions pertaining to the personnel-related services that the Army provided for soldiers. These questions examined the quality of the financial services, availability of personnel and medical records, and the availability of orders. Enlisted soldiers found the financial services to be less adequate than the commissioned officers. Additionally, the availability of personnel and medical records decreased substantially throughout mobilization for both soldiers and officers.

Table 3-3. Previous Mobilization Arrangements and Respondents' Evaluation of How Well Their Arrangements Worked by Percentages of Personnel Group.

Type of Arrangement	*Enlisted*		*Commissioned*	
	Yes	*Agreed Worked Well*	*Yes*	*Agreed Worked Well*
Family Plan	62.3	75.8	78.3	82.1
Will	47.5	70.8	67.6	85.3
Power of Attorney	51.1	70.8	56.1	86.3

STAMP also asked several questions pertaining to the availability of orders during ODS. Approximately 65% to 75% of the mobilized soldiers believed their orders were available when needed. Although officers' ratings were consistently higher than enlisted soldiers, little fluctuation existed across subgroups.

Questions were also asked which examined soldiers' perceptions of availability of information during ODS. These questions included issues related to the adequacy of information from the gaining command and satisfaction with mail delivery. The results differed dramatically from the perceptions of the availability of orders. Less than 50% of soldiers felt the Army gave enough information to make decisions about their personal lives. These numbers did not significantly improve, even after soldiers had returned to civilian life.

Soldiers' Perceptions of Leadership. STAMP asked several questions to ascertain soldiers' perceptions of ODS leadership. Results indicated that good leadership involves

technical competence and concern for people. Both of these leadership items had positive correlations with four outcome variables: career intent to remain in the Guard/Reserve, perceptions of unit morale, overall satisfaction with the Army, and perceptions of unit readiness. Additionally, technical competence and concern for people were correlated with each other ($r = .74$). Therefore, it is apparent that a strong relationship exists between leaders who possess these qualities and the outcome variables.

Results from the Army Nurse Corps. STAMP data collected from Army nurses showed that concerns related to downsizing played a central role in plans to either remain in or leave the Army. Other variables related to career intentions included satisfaction with the promotion system, job satisfaction, and particularly for Reserve nurses, concern about the potential of having to serve in combat environments. Participation in ODS, per se, did not appear to have a direct on career plans.

Conclusions

The RC has become an especially vital part of the military due to increased downsizing. STAMP and similar surveys provide the Army with the necessary information to address the problems facing the RC. Specific conclusions that should help the Army to maximize the potential of the RC and ensure its success for future mobilizations are listed below.

Economic Loss. Many soldiers experienced a loss in income as a result of being deployed for ODS. The Army should encourage and promote "business care plans" to alleviate the economic strains experienced by self-employed reservists who are deployed. These plans could provide direction to ensure the survival of the business while the soldier is deployed.

Communications. The Army should concentrate on improving communication throughout the chain of command. This improvement could result in improved morale, cohesion, and stress reduction. Additionally, communication needs to be increased between the Army, soldier, and the soldier's family.

Leadership. STAMP's findings suggest that leaders should possess technical competence and concern for the soldier and the soldier's family. The Army should continue to encourage the use of resources to develop effective leaders.

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An Examination of IRR Call-Up Attitudes During ODS

In 1991, ODS required the mobilization of the IRR. The IRR primarily comprises RC soldiers who had at one time served with an active or reserve unit and are now "on call" to be mobilized as needed, often to fulfill a military obligation. Although there is no training in the IRR (aside from "refresher training" prior to deployment), these soldiers have learned the necessary skills while serving for their active units. Therefore, the IRR plays an instrumental role during times of national crisis because these pre-trained soldiers are available to support defensive efforts when necessary.

What Was Done

The IRR call-up for ODS gave ARI the opportunity to explore the problems experienced by members of the IRR during mobilization. ARI developed a 31-item questionnaire to assess Army background, MOS task preparation, and the impact of the call-up process. In addition to the questionnaire, ARI used several existing databases to acquire background information (i.e., rank and volunteer status). A total of 3,051 completed questionnaires were received from IRR soldiers.

What Was Found

The majority of IRR soldiers exhibited a negative reaction upon being called up (see Figure 3-3). Soldiers indicated that their initial reaction remained constant throughout the mobilization process. ARI attempted to identify the variables that did and did not differentiate soldiers who had a positive or negative attitude toward being called up. Table 3-4 reveals all variables that discriminated between the groups were directly related to the Army while the majority of variables that did not discriminate were associated with personal and family issues.

Figure 3-4 depicts the relationship between the soldiers' attitudes toward being called up and their attitudes toward active Army service upon leaving.

The questionnaire also gave soldiers the opportunity to provide written comments about their in-processing experience. Over half of the soldiers provided such comments. The majority of comments described extremely negative in-processing experiences. A summary of the major themes addressed in these comments is provided below.

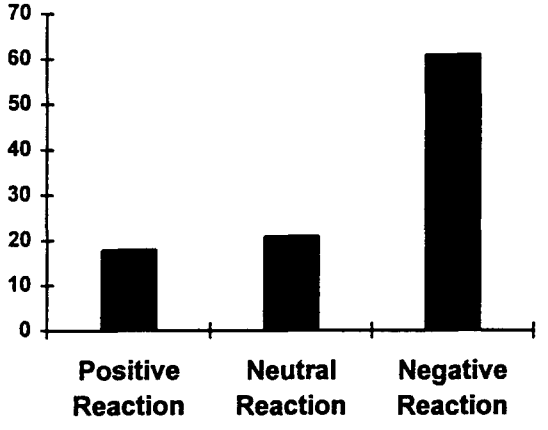


Figure 3.3. Percentage of IRR Soldiers Exhibiting Each Reaction Upon Being Called Up.

Table 3-4. Variables That Did and Did Not Differentiate on Attitude Towards Being Called Up.

Discriminating Variables	*Non-discriminating Variables*
Attitude toward Active Army service upon leaving	Marital status Number of children
Attitude toward primary MOS during previous duty	Dependents Supported Job
Technical ability (after retraining) to perform Army job	Personal Income Change School
Motivation to perform Army duties	Time in IRR
Confidence in ability to perform well in combat situations	Age Rank

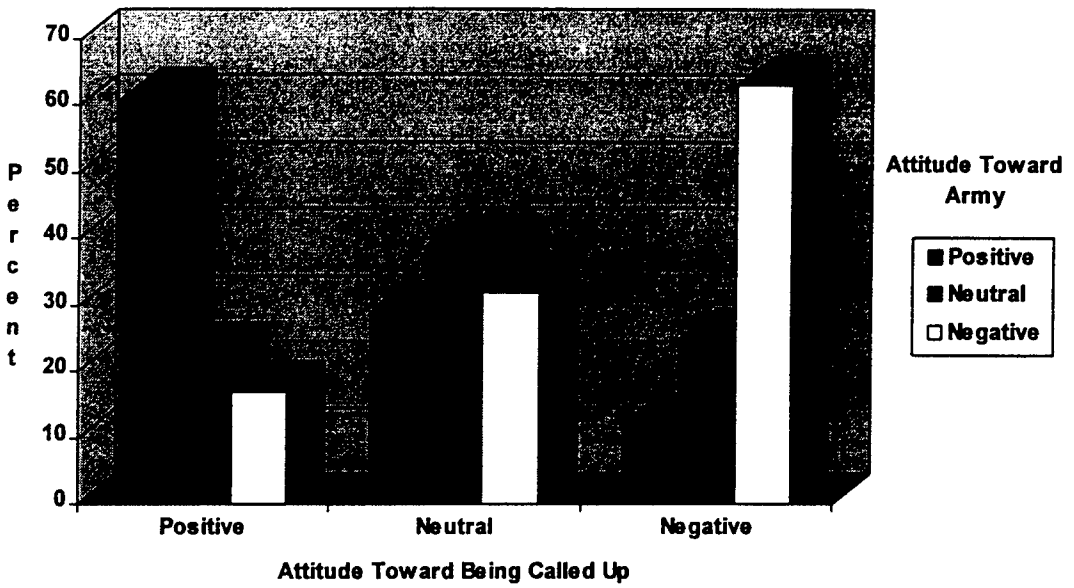


Figure 3-4. Relationship Between Attitude Toward Being Called Up and Attitude Toward Active Army Service Upon Leaving.

Disorganization, Long Lines, and Lack of Information. The greatest number of complaints concerned the lack of organization during in-processing. Most of the respondents commented on the extremely long lines and the inability of personnel to answer questions concerning in-processing procedures. For example, one soldier stated "nobody knew what was going on, so over 250 civilians/soldiers were standing around for hours at a time trying to get some type of answer on what was going on." Other soldiers complained they were sent to more than one location to complete their in-processing. As a result, these soldiers had to go through the entire in-processing procedure more than once.

Poor Treatment. Respondents reported being treated extremely poorly by those in charge. Examples cited included being lied to, locked in barracks overnight, and given curfews. One soldier commented "we were treated like animals, not the seasoned soldiers that we are. The Reservists put in charge of us failed to realize that our recalled NCOs can make things happen. We were treated with no respect, which resulted in less motivation and poorer attitudes."

Inappropriate Training/Lack of Proficiency in MOS. Soldiers complained of inadequate training for several reasons. These reasons included a lack of emphasis on MOS training, wasted time during training, and training that was too easy to pass. Additionally, many soldiers expressed frustration at being assigned to a new MOS at the in-processing center despite

lacking the necessary skills to successfully perform that MOS. These soldiers felt incapable of learning the required skills in the allotted training time, resulting in a lack of motivation.

Medical Treatment. Respondents reported poor treatment by medical personnel. This poor treatment related to inadequate screening and a perceived lack of caring by the examiners. Additionally, soldiers with "missing" records were required to receive shots that were not needed.

Other Areas. Complaints in other areas focused on a variety of other issues, including problems receiving pay, loss of income as a result of being called up, and not enough notice given prior to being called up.

Conclusions

It was evident that many of the IRR soldiers endured extremely negative call-up experiences. Questionnaires, such as the one conducted by ARI, can provide insight into the exact nature of these problematic issues. It is important that the Army focus on the issues addressed here in order to avoid similar problems in future mobilizations.

One area identified for improvement was in-processing. Suggested recommendations included establishing procedures to process large numbers of soldiers at one time, organizing work stations to maximize the number of people to be processed each day, ensuring that in-processing personnel are trained and capable of providing information and answering questions, and eliminating the need for soldiers to be in-processed at more than one location.

It is equally important that training time be maximized at the in-processing locations. For example, if an individual is assigned to a new MOS at call-up, it is essential that training be adjusted to accommodate the inexperience of the soldier. Additionally, guidelines need to be established for the purpose of training at the in-processing centers. For example, if the goal of the training at the in-processing locations is recertification, it is important to communicate this to the IRR soldiers and assure them that there will be more in-depth training or situation-relevant training at a later time.

Finally, it is important the Army be cognizant of the disruption in soldiers' personal lives that occur as a result of being called-up. Survey respondents suggested that the Army offer information about services and support groups to help spouses cope with the additional burdens placed upon them. Additionally, it was felt that distribution of financial information would have helped families cope with the economic strain that was experienced due to the call-up. Focusing on the above mentioned issues will allow the Army to maximize the potential of the IRR and ensure its success in future mobilizations.

Product Reference

Steinberg, A.G. (1991). *Individual Ready Reserve (IRR) Call-Up: Attitudes, Motivation, and Concerns.* (ARI Research Report 1594). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Related References

Evans, K.L. (1992). *The Mobilization of Individual Ready Reserve (IRR) Infantry During Operation DESERT STORM: Training Performance Analysis.* (ARI Research Report 1621). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

New Recruit Surveys

Recruitment and retention have been major areas of concern for both the AC and RC for some time. In the early 1980's, ARI began the development and administration of the ARI Surveys of Army Recruits, more commonly known as the New Recruit Surveys (NRS). ARI developed and administered the NRS to samples of new recruits on a yearly basis. In the late 1980's, the NRS shifted to an operational function when the U.S. Army Recruiting Command (USAREC) took over its annual administration and analysis.

The NRS focuses on questions related to the recruit's enlistment decision (See Table 3-5). For example, what Army advertising, if any, is the recruit familiar with? What factors were most important in the decision to enlist (e.g., patriotism, money for college)? Who had the most influence on the decision to enlist (e.g., parents, friends, recruiter)? What are the recruit's career goals (e.g., make the Army a career, stay for one enlistment term)? ARI's analyses of the answers to these questions have helped USAREC evaluate the effectiveness of Army advertising and provide guidance to recruiters on effective strategies for influencing a prospect's enlistment decision. Although there are reports which provide survey responses for the ARNG and USAR, none of these summarize RC responses in a succinct fashion. Other research has linked NRS data with subsequent separation from the Army. One of these projects is the subject of the remainder of this product summary.

What Was Done

One administration of the NRS involved 1,683 nonprior service accessions into the USAR and 2,752 accessions into the ARNG who were processed through seven U.S. Army Reception Stations during May and June, 1982. Attrition data were merged with data from the Reserve Components Common Personnel Data System (RCCPDS) to determine attrition

between the 1982 survey and mid-1987; the RCCPDS files included attrition data through June 1987. Records for 1,638 of the original 1,683 NRS USAR respondents, and 2,375 of the original 2,752 NRS ARNG respondents were successfully matched with RCCPDS records. Attrition was defined as separation to become a civilian or a member of the IRR.

The general purpose of the research was to test the "moonlighting" hypothesis of reserve attrition. That is, if soldiers attrit for the same reasons that civilians leave their part-time jobs, then reserve attrition could be hypothesized to depend upon migration pattern, marital status changes, age, race, gender, education, and mental category. With the addition of NRS data, the research was also able to test the degree to which reserve attrition depended on employment status at enlistment, stated career intentions, receipt of enlistment bonuses or New GI Bill benefits, educational aspirations, and grades achieved in school.

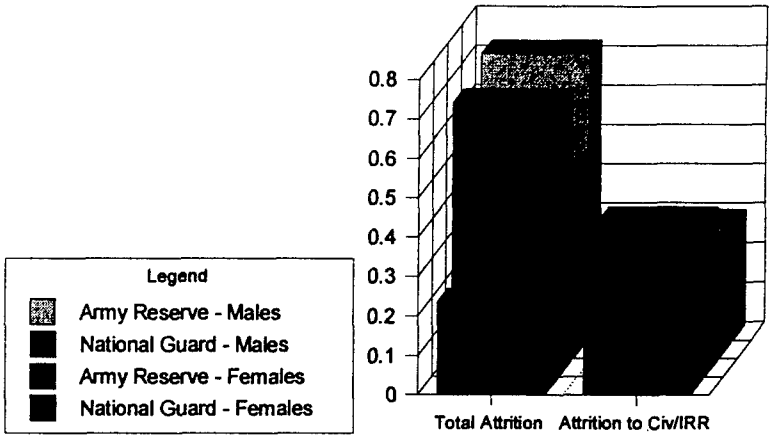
Table 3-5. The 1982 New Recruit Survey.

Section Title	*Topics Covered*
Background	Individual history Family history Marital history
Experience	Educational experience Types of schools attended Highest grade completed Labor force experience Number of employers Income before enlisting
Enlistment	Term of enlistment Whether recipient of enlistment bonuses or Army College Fund Whether initial Army contact made through mail-in coupons Recruiter contact
Decision making	Reasons for enlisting Post-accession plans

What Was Found

When looking at gender, there were no significant differences in attrition rates for male and female Reservists and Guard members between 1982 and 1987 (see Figure 3-5). However, female sample sizes were relatively small so that definite conclusions were not drawn. As expected, male and female Reservists and Guardsmen who indicated they planned to leave the Army after their initial enlistment all had higher than average attrition rates. Interestingly, soldiers who indicated they planned to stay in the Army after their initial enlistment had the same attrition rates as soldiers who indicated they did not know what their future plans were.

Figure 3-5. Attrition rates as of 1987: NRS soldiers who enlisted in 1982.



No differences in attrition rates were found between soldiers who enlisted whether or not they wanted money for college, or among soldiers who had different levels of educational aspirations. However, students who had low grades when last in school, regardless of gender, had higher than average attrition rates. Family status also was found to be ineffective as a predictor of attrition, as no differences were found except for single parents.

In terms of unemployment, a high number of soldiers indicated they enlisted because they could not find a job. Those same soldiers had significantly higher than average attrition rates, providing evidence for the "moonlighting" hypothesis. It is reasonable that soldiers who enlist because they cannot find a job would have a higher probability of attriting, with the assumption they eventually found a higher paying job.

For male guardsmen, enlistment bonuses were found to be correlated with lower attrition rates. However, the sample sizes for male and female Reservists and female Guard members were not large enough for definite conclusions to be drawn. Previous research had concluded the reenlistment bonuses served to decrease attrition rates for soldiers in the Reserve; however, this research suggested that enlistment bonuses were likely to have a more marginal effect on attrition rates (at least) for male Reservists.

Conclusions

Results of this research included the conclusion that higher quality soldiers tended to have lower attrition rates than did lower quality soldiers, and family status was not a good predictor of attrition for most recruits. Also the one-third of reservists in 1982 who indicated their primary reason for enlisting was unemployment had higher than average rates of attrition. This finding is particularly interesting because it supports the hypothesis that at least some soldiers enlist and attrit primarily because of financial reasons, as opposed to the hypothesis that soldiers enlist and remain in the military for noneconomic reasons.

Another result concerned recruits' intentions to leave the Army. Specifically, results indicated that soldiers who said they intended to leave the Army after their first enlistment had higher than average attrition rates. However, soldiers who said they intended to stay in the Army actually attritted at the same rate as did soldiers who were unsure of their future plans.

Further analysis of NRS data collected on RC recruits could be very informative for RC policy-makers. It would be particularly interesting to look at trends for motivations for enlisting over the years, and for examining more recent data that would help the RC in its current recruiting efforts.

Overall, the NRS provide information about the characteristics, knowledge of enlistment options, and enlistment motivations of new RC recruits. This information can help Army planners to be aware of enlistment and retention trends, and to plan for the RC's role to ensure the Army meets its human resource requirements.

Product Reference

Dale, C. (1989). *The Determinants of Attrition from the Army Selected Reserves* (ARI Technical Report 831). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Related References

Levine, E. L. (1987). *The 1986 ARI Survey of U.S. Army Recruits: Survey Administration* (ARI Research Note 87-57). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Westat, Inc. (1986). *The 1985 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accessions* (ARI Research Product 86-16). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Westat, Inc. (1986). *The 1985 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accessions, Volume 1* (ARI Research Product 86-17). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Westat, Inc. (1986). *The 1985 ARI Survey of Army Recruits: Tabular Description of Army National Guard Accessions, Volume 2* (ARI Research Product 86-18). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Army Experience Survey

In an attempt to answer questions about the Army's ability to provide job satisfaction and retain high-quality soldiers serving in RC units, a model of job satisfaction was developed. The model used data from the Army Experience Survey (AES) and included concepts from relevant psychological, sociological, and economic literature. The intent of this model was to provide a comprehensive examination of the determinants of job satisfaction specific to the USAR and ARNG. Given the belief that the Army is capable of providing job satisfaction, the goal of the model was to help the Army identify the variables needed to retain its high quality soldiers.

What Was Done

The AES data were gathered in 1985 from a sample of soldiers in RC units (i.e., enlisted soldiers separated from the active Army and who had joined these units after their separation). The survey asked the veterans about their satisfaction levels while in the Army and while in the USAR/ARNG. Additionally, soldiers were asked about the environment in the Army and to indicate reasons for their satisfaction or dissatisfaction.

Because the AES included over 100 variables, manual and statistical procedures were performed to eliminate irrelevant variables and to group the variables (i.e., psychological, sociological, and economic variables). The statistical procedure (factor analysis) resulted in eight factors that explained many of the reasons for the soldiers' job satisfaction while in the Army (i.e., 59% of the total variance of job satisfaction in RC units). Table 3-6 provides a summary of the relationship between the factors and the variables associated with the factors. The higher the factor loadings (the correlations between 1.00 and .00 of the relationship between the factor and the variable itself), the more that is understood by the factor. For example, the variable "Developed pride in self" (correlation of .77) helps increase understanding of "Positive Army Impact" (Factor 1) more than does the variable "Self-improvement" (correlation of .35). All but the final two factors (Factor 7 and Factor 8) contained examples of psychological, sociological, and economic variables.

The second stage of analysis involved a non-linear multivariate logistic regression model designed to predict job satisfaction. The predictors included (a) factor score characteristics of the individual soldiers on the eight factors and (b) the following additional independent variables:

- Satisfaction with Army
- Effect of Army service on satisfaction of relationship with spouse during Army service
- Effect of Army service on satisfaction of relationship with children during Army service
- Value of Army experience
- Age
- Race
- Number of enlistment terms served
- Gender
- Education at enlistment
- Enlistment bonus recipient
- Number of children
- Veteran's income
- Family income of veteran
- Involuntary attritees
- Career-intentional soldiers

Table 3-6. List of Factors and Associated Variables.		
Factor	***Variables***	***Factor Loadings***
Factor 1: Positive Army Impact	Development of job skills	.49
	Development of self-confidence	.74
	Development of leadership ability	.70
	Development of ability to work with others	.72
	Developed respect for authority	.61
	Developed pride in self	.77
	Developed openness to new ideas	.62
	Pride in serving country	.52
	Increased ability to make friends	.60
	Established independence	.63
	Developed self-discipline	.70
	Self-improvement	.35
Factor 2: Separated for Dissatisfaction with Environment	Apathetic officers	.66
	Failed to get promoted	.48
	Poor NCO leadership	.66
	Pay was too bad	
	Long working hours	.35
	No credit for good work	.39
	Lacked training I wanted	.73
	Didn't get along with NCOs	.32
	Too many rules	.51
	Too much unfair treatment	.39
	Uninteresting work	.78
	Inadequate family services	.51
		.28
Factor 3: Separated for Family Reasons	Too many PCS moves	.49
	Pay was too low	
	Long working hours	.31
	Too much family separation	.40
		.66
Factor 4: Education Level	Pre-enlistment	.66
	When left Army	.70
	Current (i.e., after leaving Army)	.68

Table 3-6. List of Factors and Associated Variables. (Continued)		
Factor	***Variables***	***Factor Loading***
Factor 5: Schooling/Training Motive for Enlisting	Money for college	.59
	Lacked training I wanted	.88
	To go to school/college	.51
Factor 6: Personal Improvement Reasons for Enlistment	I was unemployed	.33
	I proved I could do it	.51
	To be on my own	.66
	To earn more money	.47
	To travel	.37
	To solve a personal problem	.37
	To mature	.48
Factor 7: Institutional or Patriotic Soldier	To serve my country	.79
	Family tradition to serve country	.29
	Pride in serving country	.51
Factor 8: Occupational Soldier	Self-improvement motive to enlist	.46
	To develop a skill	.69
	To earn more money	.36

What Was Found

Variables from all disciplines (i.e., psychological, sociological, and economic) helped to explain job satisfaction in RC units. A positive relationship existed between job satisfaction and the Army's developmental impact. Therefore, as the positive developmental impact increased, job satisfaction increased. Specific items associated with this factor (Factor 1) included development of job skills, development of self-confidence, and self-improvement. A negative relationship was found between dissatisfaction with the environment and job satisfaction. As dissatisfaction with the environment increased, job satisfaction decreased. Specific items associated with this factor (Factor 2) included apathetic officers, uninteresting work, and too many rules. Additionally, those soldiers who had joined the active Army for schooling/training reasons (Factor 5) had higher levels of job satisfaction with their RC units. Finally, job satisfaction was found to increase with increases in the institutional or patriotic orientation of soldiers (Factor 7).

In addition to the factors, six (of the 15) independent variables also helped explain job satisfaction. The effect of Army service on satisfaction of relationship with spouse during service increased job satisfaction in the RC units. Also, black soldiers were more satisfied with these units relative to non-black soldiers. This is a common finding in job satisfaction research. Soldiers who received enlistment bonuses were more satisfied than soldiers who did not receive

enlistment bonuses. An increase in a soldier's income was found to be positively related to job satisfaction. Finally, soldiers who planned to make the Army their career were more satisfied than soldiers who did not plan to make the Army their career.

Conclusions

Findings from this study indicate several ways that job satisfaction with the RC may be increased. For instance, job satisfaction may be increased if enlistment bonuses were offered and if the job environment were changed. Due to budget constraints, payment of enlistment bonuses may not feasible in the future. However, the job environment could be changed by retraining apathetic officers, reducing work hours, ensuring equitable treatment, giving credit for good work, providing appropriate training to soldiers, increasing cooperative peers, and enhancing self-confidence of the soldiers. Job satisfaction might also be increased by extending to the RC the programs available to the AC soldier (e.g., quality health care at a reasonable cost, child care and child development services, youth programs, family advocacy, recreational programs).

Product Reference

Lakhani, H. A. (1990). *The Determinants of Job Satisfaction in U.S. Army Reserve/National Guard Units: A Multidisciplinary Analysis* (ARI Technical Report 907). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Westat, Inc. (1986). *The 1985 Army Experience Survey Data Sourcebook and User's Manual* (ARI Research Note 86-01). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

An Examination of Attrition After NTC, Reforger, and Blazing Trails Exercises

In order to increase training readiness for the RC, the Army has attempted to provide more training opportunities (Grissmer, Kirby, & Nogami, 1990). This has included increased opportunities to participate in combat training at the NTC, European (Reforger) mobilization exercises, and construction and logistics exercises in Central America (Blazing Trails). Previous research by ARI, however, had revealed that additional RC training time results in negative wage rates because of lost civilian income. As a result, many soldiers are choosing to leave the RC rather than sacrifice their civilian income because of additional training demands. Therefore, although additional training time might increase training readiness, it can also result in increased attrition rates.

What Was Done

An initial ARI study revealed that ARNG units participating in NTC had a 25% higher attrition rate than those units not participating in NTC. The results of that study generated interest in determining the causes of this elevated attrition rate. As a result, ARI conducted a follow-up study that examined RC units participating in NTC, Reforger, and Blazing Trails. These units were compared to similar units that had not participated in the additional training. ARI performed case studies, in which they conducted interviews with various members of each unit. In the interviews, information was gathered pertaining to the unit itself, personnel, exercise preparation and execution, recovery, civilian/employer issues, family issues, compensation issues, and specific unit issues (including attrition). Data from these interviews, combined with data from the Defense Manpower Data Center (DMDC), were used to determine possible reasons for differences in attrition levels between units that did and did not participate in the additional training exercises.

What Was Found

Table 3-7 indicates that units participating in NTC, Reforger, and Blazing Trails had higher attrition rates than the comparison units. This difference was most pronounced between the NTC units and their comparison units. NTC demands a much more rigorous training schedule than Reforger or Blazing Trails, requiring a year long train up and 3 weeks of AT rather than 2 weeks. Reforger requires 3 weeks of AT, but no period of train up and Blazing Trails requires less than 3 weeks of AT and minimal amounts of extra training time.

Information gathered from soldiers generated four plausible hypotheses for the increased attrition rate among those units participating in NTC, Reforger, and Blazing Trails. The first hypothesis suggests that there is a conflict for RC members between family and the amount of time devoted to the Reserves (see Table 3-8). These data indicate that lower-level enlisted personnel and mid-level officers encountered higher levels of family problems because of AT. It is especially disturbing to see these problems among the mid-level officers because these groups had a considerable amount of time to adapt to the demands of RC participation. One plausible explanation is that these officers have younger children at home.

Table 3-7. Attrition/Transfers in NTC/Reforger/Blazing Trails Versus Comparison Units Over an 18-Month Period.				
Type of Unit	*Separated from Guard Unit (%)*	*Transferred to Another Guard Unit (%)*	*Overall Unit Attrition (%)*	*Remaining in Original Unit (%)*
NTC units	25.46	4.49	29.95	70.05
Comparison Units	19.56	3.01	22.57	77.43
Reforger Units	23.34	5.08	28.42	71.58
Comparison Units	21.14	5.58	26.72	73.28
Blazing Trails Units	27.38	4.15	31.53	68.47
Comparison Units	25.17	5.45	30.62	69.38

Table 3-8. Responses to the Question "How Much of a Problem for the Family is the Absence for the Following?"			
Grade	*Weekend Drills*	*Annual Training*	*Extra Time Spent at Guard/Reserve*
Enlisted			
E3	18.7	38.3	30.1
E4	16.3	30.2	22.1
E5	13.8	24.1	21.1
E6	14.9	24.0	22.7
E7	14.5	22.9	22.2
E8	19.1	24.7	30.6
E9	20.8	23.2	33.9
Total	15.1	25.2	22.6
Officer			
O1	13.6	25.0	29.5
O2	19.6	29.4	36.4
O3	27.9	37.6	42.9
O4	30.0	36.6	40.8
O5	27.2	32.5	34.8
O6	23.7	26.5	27.9
Total	26.7	34.3	38.5

Note: Percents are for those reporting "serious/somewhat of a problem."

A second explanation for increased attrition rates concerns increased levels of employer conflict. Table 3-9 shows that weekend drills caused fewer problems with employers than the other three alternatives: AT, extra time spent at the ARNG/USAR, and time spent at work on ARNG/USAR business. Among these alternatives, absence for AT caused the most problems with employers.

Table 3-9. Responses to the Question "How Much of a Problem for Your Main Employer (or for You, if Self-Employed) is Absence for the Following?"

Grade	*Weekend Drills*	*Annual Training*	*Extra Time Spent at Guard/Reserve*	*Time Spent at Work on Guard/ Reserve Business*
Enlisted				
E3	19.0	34.6	31.5	23.3
E4	15.6	31.3	27.2	19.5
E5	14.0	27.8	28.3	21.0
E6	12.7	27.6	25.9	21.0
E7	12.4	27.6	24.3	21.7
E8	11.9	27.2	22.1	19.9
E9	10.4	28.0	23.3	20.6
Total	14.0	28.8	26.8	20.7
Officer				
O1	15.1	35.6	31.8	25.8
O2	13.1	30.8	33.5	24.5
O3	14.6	39.5	33.2	26.8
O4	13.3	37.6	32.1	26.5
O5	10.1	35.7	27.0	22.4
O6	12.8	33.2	25.5	22.1
Total	13.3	36.7	31.4	25.3

Note: Percents are for those reporting "serious/somewhat of a problem."

Another reason for increased attrition rates can be attributed to lost pay opportunities for reservists. Specifically, reservists will often have to surrender overtime/extra pay opportunities at their civilian jobs because of RC obligations. Table 3-10 shows that these losses are much more pronounced for enlisted personnel than officers. One possible explanation for this discrepancy is that enlisted members are more likely to be paid wage premiums for working overtime; as a result, overtime pay can have a larger impact on enlisted members' total income than officers' total income.

Table 3-10. Responses to the Question "In 1985, Did You Lose Opportunities for Overtime/Extra Pay Because of Your Guard/Reserve Obligations?"			
Grade	*Yes, Frequently (%)*	*Yes, Occasionally (%)*	*No (%)*
Enlisted			
E3	23.4	33.8	42.8
E4	16.9	32.6	50.5
E5	14.4	33.4	52.2
E7	12.5	28.9	58.6
E6	13.9	32.3	53.8
E8	10.2	26.8	63.0
E9	8.8	21.4	69.8
Total	14.9	32.1	53.0
Officer			
O1	11.1	29.4	59.5
O2	8.2	27.3	64.5
O3	7.9	16.5	75.6
O4	6.9	14.0	79.1
O5	6.1	10.0	83.9
O6	6.9	9.1	84.0
Total	7.5	16.4	76.1

A final explanation for the increased attrition level is the implementation of higher performance standards for those units preparing for advanced training, such as NTC. Most of the units studied had members transferred, separated, or retired as a result of a combination of being unphysically fit, performing marginally, or lacking dedication to the advanced training. These member losses usually occurred early in the training schedule and resulted from a desire for the unit to perform proficiently at the training sessions.

Conclusions

ARI demonstrated that personnel who participated in NTC, Reforger, and Blazing Trails had higher attrition levels than personnel who did not participate in these training exercises. The following four hypotheses were offered as possible explanations for the elevated attrition level:

- The additional training time caused family conflicts which led to separation or transfer.
- The additional training time caused employer problems which led to separation or transfer.

- The additional training time caused increased loss of income.
- Tighter physical conditioning and performance standards in preparation for training resulted in the transfer or separation of marginal performers.

The study was not able to ascertain how much attrition could be attributed to each hypothesis; however, the case studies provide evidence that each hypothesis was functional and played a role in causing attrition. A more comprehensive study would be needed to determine the amount of attrition associated with each hypothesis.

Finally, it is important to recognize the distinction between the first three hypotheses and the last one. The first three identify reservists who quit or transferred as a result of conflicts (i.e., family conflicts, employer conflicts, and income conflicts) associated with the additional training. The last hypothesis involves reservists who were transferred or separated because of marginal performance. Consequently, this latter case of attrition can actually have a positive effect on personnel readiness. Therefore, if the Army can focus on ways to resolve the conflicts listed in the first three hypotheses, it could be ensured of highly trained soldiers with low attrition rates.

Product Reference

Grissmer, D.W., Kirby, S. & Nogami, G.Y. (1990*). Comparison of Retention Patterns for Army National Guard and Army Reserve Units Participating in National Training Center, Reforger, and Blazing Trails Exercises.* (ARI Technical Report 870). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Related Reference

Grissmer, D.W., & Nogami, G.Y. (1988). *Retention Patterns for Army National Guard Units Attending the National Training Center.* (ARI Technical Report 781). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Robust Test: Assessment of the Impact of Differing Levels of Resources on Selected ARNG Units

A long-standing problem in the military has been the determination of levels of human resources required to prepare for and accomplish specific tasks, missions, and objectives. Such a determination is essential for obtaining, allocating, and justifying the level of those resources. The determination of levels of resources (i.e., training time and training support personnel) is particularly important for the ARNG to achieve and maintain unit readiness, yet doing so is especially difficult because of the ARNG's intermittent training schedule. To study this issue, the ARNG designed the "Robust Test" to examine the readiness impact over time of differing levels of full-time training support personnel and increments of additional training assemblies, as well as other readiness indicators (i.e., Unit Status Reports [USRs], Operational Readiness Evaluations [OERs], and general unit operations), on the training resources needed. ARI provided support to "Robust Test" by assessing the impact of the differing levels of resources on leadership, motivation, and unit cohesion.

What Was Done

The Robust Test sample included four line companies from one mechanized infantry battalion and four line companies from one armor battalion. For each battalion, one company served as a control group with no additional support personnel or training assemblies provided (MC=Mechanized Infantry, Control group and AC=Armor, Control group); one company was given extra full-time support personnel (MF=Mechanized Infantry, Full-time Support and AF=Armor, Full-time Support); one company was given extra training assemblies (MT=Mechanized Infantry, Training Assemblies and AT=Army, Training Assemblies); and one company served as the "robust" group and was given extra full-time support personnel and training assemblies (MR=Mechanized Infantry, Robust condition and AR=Armor, Robust condition).

Questionnaires were administered and standard unit reports and company level OERs were examined to assess the initial status, readiness, leadership, and cohesion of the companies. The Combat Unit Cohesion Questionnaire, developed by ARI, served as the primary survey instrument and was administered in 1993 and in 1994 to available soldiers in each company (Siebold & Browning, Jr., 1996). See Table 3-11 for a summary of the number of soldiers responding each year to the questionnaires. Both questionnaire versions included items that addressed the topics of cohesion among squad members, cohesion between squad members and their leaders, cohesion among leaders, and cohesion with the unit as a whole; see Table 3-12 for a summary of the leadership and cohesion questionnaire scales. The 1994 version contained items on job motivation, ORE motivation, the unit learning climate, leader effectiveness, soldier perceptions of drills, unit conditions, family support and time conflicts.

Table 3-11. Number of Soldiers Responding to the Combat Unit Cohesion Questionnaire by Year.

Year	MR	MF	MC	MT	AF	AT	AR	AC
1993	53	34	51	37	59	61	56	35
1994	62	26	41	59	61	32	32	56

Table 3-12. Leadership and Cohesion Questionnaire Scales.

Job Motivation	Leader Bonding
Event (ORE) Motivation	Leadership
Learning Climate	Rule Clarity
Job Satisfaction	Unit Pride
Leader Effectiveness	Unit Satisfaction
Squad Member Bonding	Goal Attainment
Squad Teamwork	External Conflicts
Vertical Bonding	

What Was Found

Leadership and Cohesion Scales. The majority of items on the Combat Unit Cohesion Questionnaire included sets of questions that addressed the topics of motivation, unit cohesion, and leadership. Because these sets of questions had been developed in prior research with AC Army combat units, it was important to ensure their appropriateness for use with ARNG combat units. Therefore, a factor analysis was conducted based on responses by ARNG members and responses by active duty members. Results of this analysis showed that ARNG members responded similarly to active duty combat soldiers on all questionnaire scales, indicating the leadership and cohesion scales were appropriate for use with ARNG combat units.

Company Assessments. Comparisons were made within battalion and across test resourcing type. Overall, ratings from armor battalion respondents were higher on all questionnaire scales (refer to Table 3-12 for the various questionnaire scales) than those of mechanized infantry battalion respondents. As a group, the three extra resourced armor companies (i.e., AF, AT, and AR) had higher ratings than the other companies' respondents. Additionally, the armor control company (AC) had similar ratings to respondents in the mechanized infantry robust condition (MR). Finally, as a group, the three remaining mechanized infantry companies (MF, MC, and MT) tended to have lower ratings than the respondents in the other companies.

One of the fundamental questions addressed by Robust Test was whether or not soldiers in the eight companies perceived changes in levels of leadership and cohesion as a result of the different levels of assigned resources. The main change found among the companies was an increase in squad member bonding for seven of the eight companies. It was suggested the greater stabilization of squad members and an enhanced sense of purpose among the soldiers was the result of having participated in Robust Test, rather than the result of receiving different levels of resources.

Examination of responses to the different questionnaire scales indicated the smallest differences among the companies were found in responses to the questions concerning "external conflicts." This finding implies that differences found for the other questionnaire scales were the result of differences within the companies that were under the control of the leaders. In support of this, the largest differences among the companies were found to be in responses to the questions concerning "leadership" (i.e., vertical bonding between leaders and subordinates and bonding among the leaders in a company).

Because leaders' ratings are often higher than subordinates' ratings, the questionnaire data were examined to determine whether or not squad members and leaders within the companies responded differently. Examination of the data showed little change (10 to .20 points lower) between responses for the squad member subsample and responses for the full company sample. Further, examination of the leaders' ratings indicated their responses to be only slightly more positive than the ratings provided by the squad members.

The data also were examined to determine whether or not the differences found among the Robust Test companies were the result of the demographic composition of personnel in the companies. To answer this question, two companies in the mechanized infantry battalion were examined; black squad members were in the majority in one company and white squad members were in the majority in the second company. Consistent with findings from some active duty combat units, results of this assessment found ratings were similar for black and white squad members in the same company. In short, black and white squad members in the same company rated things similarly regardless of whether they were in the minority or in the majority, and different from the ratings of black and white squad members in other companies.

The scale scores were analyzed to determine whether the companies changed their perceptions of unit leadership, motivation, and cohesion from 1993 to 1994. Examination of the data indicated the two control condition companies (MC and AC) decreased on several scales. Specifically, responses for the MC company decreased on the Squad Teamwork, Vertical Bonding, Leader Bonding, Leadership, Rule Clarity, Unit Pride, and Goal Attainment scales; responses for the AC company decreased on the Leader Bonding, Leadership, Rule Clarity, Unit Pride, and Goal Attainment scales. Interestingly, the robust condition companies (MR and AR) did not change for the positive; the largest increases in amount of positive change occurred

in the companies with additional full-time support personnel (MF and AF) and the companies with additional training assemblies (MT and AT).

Overall, data from the leadership, motivation, and cohesion scales showed the eight companies could be separated into three groups. The three armor companies (AF, AT, and AR) formed one group with very high ratings on all questionnaire scales (refer to Table 3-12 for the questionnaire scales); the AC and MR companies formed another group with above average ratings on the questionnaire scales; and the three remaining mechanized infantry companies formed the third group with average ratings on the questionnaire scales.

Conclusions

Results of the Robust Test indicated that companies with the full robust condition (i.e., additional full-time support personnel and additional training assemblies) had the highest scale values or were among the highest scoring companies in terms of their perceptions of unit leadership, motivation, and cohesion. Findings also indicated that control condition companies scored the lowest or were among the lowest scoring companies in their battalions. The most perplexing results were those obtained from an analysis of perceived change for the robust companies from 1993 to 1994. That is, there was a lack of positive change in scale scores for the robust condition companies, which suggests that something other than the additional resources provided to the companies was responsible for the changes in responses.

In general, the results suggest that ARNG members in combat units provided with additional full-time support personnel and additional training assemblies perceive themselves to be highly ready to accomplish the RC's tasks, missions, and objectives.

Product Reference

Siebold, G. L & Browning, Jr., H. W. (1996). *Leadership, Resources, and Performance in Two Army National Guard Battalions* (ARI Research Note 96-24). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The Army Family Research Program

There have been various trends in the recent past that have led to an increase in attention given to military families. For instance, since World War II, the Army has moved to a large standing peacetime force, resulting in large numbers of service members and family members. Although the Armed Forces share certain characteristics with other occupations, they are nearly unique in the demands they place on their service members and their families. Within the Army, these demands include the risk of injury and death, frequent relocation, separation from family, long duty hours, unpredictability of work hours, and residence in foreign countries. Further, the military environment is characterized by masculine norms (e.g., hierarchy, dominance, power, control of emotions) that are often in conflict with family life. Soldiers who experience military/family conflict, and are worried about their families because their spouse or children are dissatisfied with Army life, will have difficulty performing well on the job. Because of the demands of military life and the ever-increasing military community, the need to provide formal support services to ensure Army soldiers and their family members remain satisfied with Army family life was created.

What Was Done

The Army Family Research Program (AFRP) was a research effort by ARI to collect information about uses of pay, attitudes of family and friends toward RC service, Army family programs, perceived community problems, use of civilian community social services, and family readiness for member mobilization. As part of the AFRP, six surveys were developed and administered to USAR and ARNG soldiers and spouses. The surveys included the:

- 1986 DoD Reserve Components Spouse Surveys - ARNG Spouses;
- 1986 DoD Reserve Components Spouse Surveys - USAR Spouses;
- 1987 Annual Survey of Army Families;
- 1986 DoD Reserve Components Members Surveys - RC Members;
- 1988 U.S. Army Reserve Troop Program Unit (TPU) Soldier Survey; and
- 1988 Troop Program Unit Attritee Research Project.

The first two surveys identified issues of concern to the spouses of ARNG and USAR members. The 1987 Annual Survey of Army Families identified the issues of Army active component spouses, while the 1986 RC Member Surveys provided a comparison for ARNG and USAR members. The final two surveys provided information about USAR members' perceptions of how Army Reserve component service affected family life.

What Was Found

One focus of the AFRP surveys was to determine whether differences exist in the types of concerns experienced by spouses of RC and AC soldiers. As expected, RC spouses were concerned about issues different from those of AC spouses. More specifically, the RC spouses were primarily concerned about benefits and entitlements, while the AC spouses were mostly concerned about the various problems that result from relocating frequently.

There also appeared to be differences in concerns and program needs for spouses of soldiers in different ranks within the RC. For instance, officers and their spouses reported conflicts between reserve military duties and family. Also, although junior enlisted spouses as a group possessed certain characteristics that suggested they would benefit from Army family programs, they lacked information about these same programs. There did seem to be shared concerns, however, between spouses of senior enlisted soldiers and spouses of junior enlisted soldiers and officers.

Along with some differences, there were a number of concerns that were shared by RC spouses. For instance, ARNG and USAR spouses had some concerns that were very similar, such as the long-term benefits of reserve service and the need for information about the unit's and family's role if mobilization were to occur.

When questioned about the possibility of mobilization, few spouses of RC soldiers thought mobilization was likely. However, spouses of lower-ranking soldiers were more likely to indicate that mobilization was possible. Perhaps because of the belief that mobilization would not occur, the majority of families reported being ill-prepared for mobilization. Although few families had completed preparations for mobilization, spouses of higher-ranking members were relatively better prepared than spouses of lower-ranking members. The spouses of RC members were highly interested in information concerning mobilization.

In general, RC spouses indicated a low awareness of the various Army family programs. However, ARNG spouses tended to be more knowledgeable about Army family programs than USAR spouses. Whether they were aware of services or not, few RC spouses indicated they would use Family Support Centers if mobilization occurred.

Both spouses and RC members reported absence from the family as being a problem. The most common complaint from spouses included unpredictable training, training during special occasions and family vacations, and extra duties; however, the RC members complained that extra duty, AT, and weekend drills were the causes of most military/family conflict. Between ARNG and USAR spouses, ARNG spouses reported having slightly more conflicts between family life and reserve military service and were more likely to feel that reserve duties caused problems for their families.

Although soldiers and their spouses cited certain problems with membership in the RC, reenlistment intentions were generally favorable. For instance, both spouses and members were of the opinion that the member should continue service in the RC. The data also indicated that spousal influence was more important in members' decisions to leave the RC than in the decision to stay.

Conclusions

In general these surveys showed that there was a lack of knowledge and use of Army family programs, especially among the junior enlisted spouses -- a group that was in the most need. It was suggested that future efforts focus on identifying the barriers to current programs and identifying additional program and service needs of RC spouses and families.

Absence from the family was viewed as a problem by both RC members and spouses. Networks of spouses and families were suggested as one method for providing mutual support (e.g., baby-sitting, problem solving) during the members' absences, particularly those that were extended. Further, it was suggested these efforts focus initially on officer spouses and members who were already dissatisfied with their reserve responsibilities.

RC spouses were not well prepared for mobilization. Programs that include information about the steps involved in mobilization, the role of the unit and family in mobilization, and ways to prepare for mobilization were offered as improvements.

Very few RC families were aware of the various Army family programs. It was suggested that Army initiatives be drafted that include a system to inform spouses and members about the Army's family programs and services. It was also suggested that initiatives be drafted to better integrate spouses and families into the RC. Encouraging active participation in social events and increasing knowledge of the unit and its mission were seen as ways to instill a sense of belonging to the unit and to the ARNG or USAR.

A major problem cited by RC members and spouses was the member's absence from the family. In particular, the spouses complained about unpredictable training which often kept the members from participating in special occasions and family vacations. Both RC members and their spouses felt that maintaining a predictable schedule of training would better allow RC spouses and families to plan special activities, including vacations, well in advance to avoid conflicting with the member's RC training. Additionally, it was suggested the Army might allow unit leaders (the group identified as having the most military/family conflicts) to exchange duties with leaders in comparable nearby units in an effort to reduce conflicts between ARNG or USAR duties and family life.

Satisfaction with his/her spouse and family was found to be very important to a RC soldier's performance and retention. It was suggested that future Army programs include formal instruction as one way to educate leaders about spouse and family issues and their overall importance to the RC soldier.

Given the above conclusions, findings from the AFRP suggest the following recommendations:

- Identify the needs of Army RC spouses and families.
- Establish and/or improve existing programs to increase mobilization preparedness.
- Set up a system to increase awareness of Army family programs.
- Generate increased cohesion in RC spouses and families.
- Maintain predictable training schedules.
- Develop unit policies that allow unit leaders to exchange duties with leaders in comparable units closer to the RC member.
- Educate leaders about the problems and concerns faced by RC spouses and families.

Product References

Griffith, J., Greenless, J., Becraft, C., Hennessy, S., & Geleta, J. (1990). *Summary of the Issues of Concern to Spouses of ARNG and USAR Soldiers, Phase 1 Final Report, Survey of Army Families: Spouses of Army National Guard (ARNG) and U.S. Army Reserve (USAR) Soldiers.* Rockville, MD: Westat, Inc.

Griffith, J., Greenless, J., Becraft, C., Hennessy, S., & Geleta, J. (1990). *Tabulation of Responses to Survey on Army Family Issues, Volume 2 of Phase 1 Final Report, Survey of Army Families; Spouses of Army National Guard (ARNG) and U.S. Army Reserve (USAR) Soldiers.* Rockville, MD: Westat, Inc

Factors Affecting Reenlistment in the Army Reserves: Evidence From the 1986 DoD Survey

ARI sponsored a series of research projects related to the economic study of military compensation and retention issues. One of the projects used Army data from the 1986 DoD Reserve Components Survey to examine the moonlighting theory of turnover behavior in part-time jobs. This is based on the Shishko-Rostker theory which hypothesizes that individuals hold jobs in addition to their primary job because of constraints on hours of work in their primary job. That is, given the hourly wage at the primary job, an individual would like to work more but is not offered that opportunity (at the current wage) by his or her primary employer. Thus, an individual will accept a second, part-time job if the wage of the part-time job exceeds the individual's value of time not spent working at the primary job. The theory holds constant those psychological factors that may affect reenlistment (e.g., patriotism, a spirit of adventure) and concentrates on the effect of financial incentives on reserve participation. Therefore, the factors

presumed to affect the decision to remain in the reserves include the wage in other moonlighting opportunities and factors affecting the member's marginal value of time at the constrained hours of work in the primary job.

What Was Done

The 1986 DoD Reserve Components Survey provided data on reservists' socioeconomic status, characteristics of civilian job, family, the labor market behavior of the spouse, and related variables. These data were matched with retention outcome data from the Reserve Components Common Personnel Data System (RCCPDS).

Reenlistment prediction equations were estimated separately for members with six or fewer years of service (YOS), members with between seven and nine YOS, and members with 10 or 11 YOS. All members had an expiration of term of service (ETS) date between February, 1986 and September, 1987. Predictor variables included reserve pay, civilian wage, family income, hours of work, years of eduction, marital status, number of dependents, spouse's wage, race, gender, USAR or ARNG, occupational category, and applicable unemployment rate.

What Was Found

Overall, the results were somewhat disappointing in that effects of most variables were mixed and few were as predicted or statistically significant. Further, while the overall response rate for the 1986 DoD Reserve Components Survey was 65 percent, the response rate for members of the Army enlisted Selected Reserves was less than 50 percent and the response rate for junior enlisted (the focus of this research) was even smaller. Retention rates were calculated for respondent versus nonrespondents to determine the potential for nonresponse bias. The retention rates for survey respondents were higher than those for nonrespondents, regardless of whether the member had an ETS between the time of the survey and September, 1987. Therefore, because retention appeared to be systematically correlated with survey response, the results may not be generalizable to the full population of RC members.

Conclusions

The results derived from this research were generally consistent with those obtained from other econometric studies of reserve reenlistment behavior. Although a major purpose of the research was to improve upon previous studies, this effort was unable to do so, with the reasons for the limited success similar to those cited by other researchers. Specifically, because reserve duty is not a full-time job on which individuals depend for their livelihood, noneconomic factors

probably play a larger role in explaining reserve versus active duty reenlistment behavior. Further, there appeared to be a nonresponse bias in the data used to estimate the models included in this research.

Product Reference

Hogan, P.F., & Villa, C.M. (1991). Factors affecting enlistment in the Army Reserves: Evidence from the 1986 DoD Survey. In C.L. Gilroy, D.K. Horne, & D.A. Smith (Eds.) *Military Compensation and Personnel Retention.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

APPENDIX A: RC Databases

The bulk of this report has described ARI research products that have been produced to support the RC. Most of this research has involved the analysis of data that have been collected on variables of interest to the RC (e.g., training scores, job satisfaction, attrition). The fact is, however, that the RC could derive considerable benefit from further analysis of the data that have already been collected and from the recording and analysis of data that are currently generated by routine operations.

Existing Databases

Table A-1 lists a number of the databases upon which research reported in this volume was based. The table includes the database name and identification code, the number of individual data files it currently comprises, the ARI researcher who currently serves as the point of contact for the database, and page numbers of the applicable project description in the main body of this report. This information was drawn from a project ARI is funding to collect and consolidate information about existing ARI databases (DiFazio & Young, 1997). This work will help assure that a database can be easily accessed and used for research, even when those who originally developed it are no longer available to guide other researchers. (For more information about the data documentation project, which at this writing is still in progress, contact Dr. Ron Tiggle at ARI.)

A number of the ARI databases include data from both AC and RC soldiers, but for which the research was primarily focused on AC needs. Therefore, a number of these databases have been under used with regard to RC interests. To the extent that the data are not now outdated, they could be used to support the investigation of issues of current interest to the RC.

Operational Databases

Informative, relatively inexpensive research could be conducted if data routinely generated by the RC were collected and preserved in a form suitable for later analysis by researchers. Training is an area in which this would be particularly useful. Consider that a major portion of ARI's RC research is devoted to the evaluation of different training strategies and technologies. If the RC routinely recorded information about training performance, the cost and imposition of conducting this type of research would be significantly reduced and the amount of research-based knowledge would be significantly increased. For example, COFT instructor/operators (I/Os) could be given a protocol for recording COFT matrix attainment prior to Table VIII (live fire qualification) and Master Gunners could be instructed to record first-run Table VIII scores. A step further would be to routinely administer specially-developed training achievement measures such as the tank gunnery prediction tool ARI developed (Hagman &

Smith, 1996). Such measures are useful because they are designed to provide a more comprehensive picture of training achievement than that provided by most operational indices (e.g., overall Table VIII qualification scores).

To work effectively, a data recording system would need to be in place and enforced to assure that data were collected as desired. Obviously, the system would need to be easy for RC personnel to support or it would not survive. But the increasing availability of computer support makes this a more attainable goal than it has been in the past. Chances are good that data could be entered into a computer file by those who record them in the first place (e.g., the Master Gunner). Alternatively, a system for recording data in a standard format on paper and then submitting this to a central source for data entry could be established.

While the inconvenience of recording data on a routine basis may not seem worth the bother, the bottom line is that information is power. There is a wealth of information out there that would allow the RC to make better choices in a variety of areas (e.g., through knowing the cost-benefits of various training options) and to more effectively defend its requirements to the Army. Clearly, there is a great deal to be gained by the careful collection and analysis of information that relates in one way or another to RC readiness.

Table A-1. ARI Database List

Database Name	ID Code	No. of Files	Point-of-Contact	Project Description
Army National Guard Armor and Mechanized Infantry Training Assessment	n/a	1	Joe Hagman	
Mini Surveys of Total Army Military Personnel (Forms 1 and for Mobilized Reservists) (Mini STAMP)	5.01	2	Paul Gade	
Army Family Research Program - Soldiers (AFRP - Soldiers)	23.01	1	Ron Tiggle, Paul Gade	
Army Family Research Program - Spouses (AFRP - Spouses)	23.02	1	Ron Tiggle, Paul Gade	
New Recruit Survey (NRS)	39.00	20	Paul Gade, Clint Walker	
Army Experience Survey (AES)	43.00	1	Ron Tiggle	
Multinational Force and Observers - Sinai: Job Knowledge Dataset #1 (JOBKNOWSAV)	57.12	1	Mike Rumsey, Dale Palmer	
Multinational Force and Observers - Sinai: Job Knowledge Dataset #2 (RAWSCOR3SAV)	57.13	1	Mike Rumsey, Dale Palmer	
Multinational Force and Observers - Sinai: Job Knowledge Dataset #3 (PSCORESSAV)	57.14	1	Mike Rumsey, Dale Palmer	
Multinational Force and Observers - Sinai: Job Knowledge Dataset #4 (ENLSTCRTSAV)	57.15	1	Mike Rumsey, Dale Palmer	
Multinational Force and Observers - Sinai: Job Knowledge Dataset #5 (NCOCRTSAV)	57.16	1	Mike Rumsey, Dale Palmer	

Table A-1. ARI Database List				
Database Name	**ID Code**	**No. of Files**	**Point-of-Contact**	**Project Description**
Multinational Force and Observers - Sinai: Job Knowledge Dataset #6 (G8ELEADSAV)	57.17	1	Guy Siebold	
Multinational Force and Observers - Sinai: Job Knowledge Dataset #7 (P8LLEADSAV)	57.18	1	Mike Rumsey, Dale Palmer, Guy Siebold	
Multinational Force and Observers - Sinai: Demographic Dataset (HAWAII_D.SAV)	57.01	1	Ron Tiggle, Bunny Lucas	
Multinational Force and Observers - Sinai: Family/Finance Dataset (MERGE3.SAV)	57.02	1	Bruce Bell	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #1 (G7PLEAD.SAV)	57.08	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #2 (G7PLEAD.SAV) (G7ELEAD.SAV)	57.04	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #3 (G8B4LEAD.SAV) (G7LLEAD.SAV)	57.05	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #4 (G8PLEAD.SAV) (G7ALEAD.SAV)	57.06	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #5 (G7LLEAD.SAV) (G8B4LEAD.SAV)	57.07	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #6 (P8ELEAD.SAV) (G8PLEAD.SAV)	57.08	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #7 (G7ALEAD.SAV) (G8ELEAD.SAV)	57.09	1	Guy Siebold	
Multinational Force and Observers - Sinai: Leadership's Climate Dataset #8 (G8LLEAD.SAV)	57.10	1	Guy Siebold	
Multinational Force and Observers - Sinai: Other #1 (IDENTITY.SAV)	57.19	1	Bob Wisher, Bunny Lucas	
Multinational Force and Observers - Sinai: Other #2 (CERT1.SAV)	57.20	1	Bob Wisher, Bunny Lucas	

Appendix References

DiFazio, A.S., & Young, W.Y. (1997). *Documentation and archival of selected ARI databases* (FR-EADD-97-05). Alexandria, VA: Human Resources Research Organization.

Hagman, J. D., & Smith, M. D. (1996). Device-Based Prediction of Tank Gunnery Performance, *Military Psychology, 8,* 59-68.